McGRAW-HILL DIGEST

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Timely McGraw-Hill Books

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By MEMBERS OF THE STAFF OF THE RADAR SCHOOL, Massachusetts Institute of Technology. 832 pages, $5.00.

The first book of its kind, this is a revision of a reference text used with marked success at the M.I.T. Radar School, bring the book up to date, with the addition of new material on such topics as Timing Circuits, Indicators, Modulators, Transmit-Receive Devices, Synchros and Servomechanisms, Automatic Frequency Control, etc. Exposition of circuits and devices provide an unusual combination of technically thorough and accurate treatment with minimum dependence upon mathematics.

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By THOMAS JOHNSON, Manager, Aveco Sales Department, American Viscose Corporation. 124 pages, $2.50.

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INDUSTRIALIZATION OF LATIN AMERICA

Edited by LLOYD J. HUGHLETT, Managing Editor, *Ingenieria Internacional, Industria* and *Construccion,* with an introduction by JOHN ABBINK, Chairman, National Foreign Trade Council, Inc. 517 pages, $5.00.

A timely symposium on Latin American industry by thirty business leaders from the United States and Latin America. This book provides business men, exporters and leaders in all fields of industry and technology affected by the Latin American economy with a comprehensive, over-all picture of the present-day Latin American industrial system, from a practical point of view. Over 120 photographs of industrial activities, maps, and graphic presentations provide a detailed review of manufacturing plants, public facilities and utilities, transportation, and recently developed resources.

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VOLUME 2 • NUMBER 1
JANUARY, 1947

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The McGraw-Hill Digest is published monthly by the McGraw-Hill Publishing Co., Inc., for circulation in all countries except the United States and Canada. Editorial and executive offices, 330 W. 42nd St., New York 18, N. Y., U.S.A. James H. McGraw, Jr., President; Curtis W. McGraw, Senior Vice-President and Treasurer; Eugene Duffield, Editorial Assistant to the President; Joseph A. Geradi, Secretary. Address correspondence regarding subscriptions to J. E. Blackburn, Jr., Director of Circulation. *Subscriptions also may be ordered through local book dealer or McGraw-Hill's London Office, Aldwych House, London, W. C. 2.* Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for three years; single copy, 50¢ (U. S. currency or equivalent).

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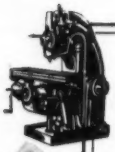
NOW 25% *average*



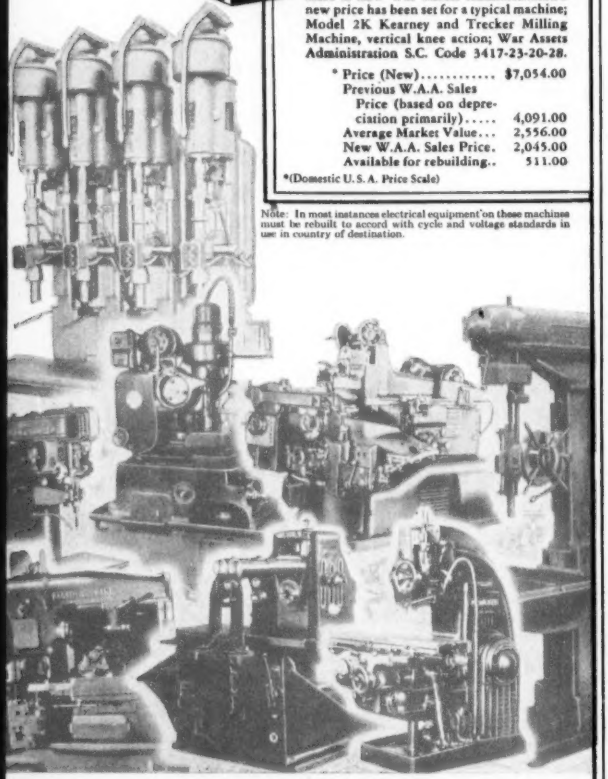
TYPICAL CASE—
MILLING MACHINE

Here is how War Assets Administration's new price has been set for a typical machine; Model 2K Kearney and Trecker Milling Machine, vertical knee action; War Assets Administration S.C. Code 3417-23-20-28.

* Price (New).....	$7,054.00
Previous W.A.A. Sales Price (based on depreciation primarily).....	4,091.00
Average Market Value...	2,556.00
New W.A.A. Sales Price.	2,045.00
Available for rebuilding..	511.00

*(Domestic U. S. A. Price Scale)

Note: In most instances electrical equipment on these machines must be rebuilt to accord with cycle and voltage standards in use in country of destination.



31 TYPES OF GENERAL PRODUCTION TOOLS REPRICED

- Boring Machine—Horizontal, Precision, Bridge Type, Single and Double End
- Chucking Machine—Automatic, Vertical, Multiple Spindle Type
- Chucking Machine—Single Spindle Automatic, Horizontal Turret Type Machine
- Chucking Machine—Six Spindle Automatic, Horizontal
- Drilling Machine or Drill Press—Bench or Floor, Single or Multiple Spindle
- Gear Cutting Machine for Straight Bevel Gears, (Not Planer Type)
- Gear Hobber—Horizontal
- Gear Hobber—Vertical, Universal
- Gear Shaper—For External Spur Gears Only
- Gear Shaper—For Spur Gears, External or Internal
- Gear Shaper—For Spur and Helical Gears, External and Internal
- Gear Tooth Shaver—For External and Internal Gears (Rotary Type Machine)
- Gear Tooth Grinder—Generating Type, for Spur and Helical Gears
- Gear Tooth Grinder—For Spur Gears, External and Internal (Formed Wheel Type Machine)
- Grinders—Centerless
- Grinder—Crank Pin Grinders
- Grinders—Plain External Cylindrical Grinder
- Grinder—Internal, Cylindrical, Automatic Sizing
- Grinder—Internal Cylindrical (Hydraulic Feed Machine)
- Grinder—Internal Cylindrical, Hydraulic Feed, for Hole and Face Grinding
- Grinder—Surface, Rotary Table Type
- Lathe—Multiple Tool, Not Automatic, Manufacturing Type Production Lathe
- Milling Machine—Automatic and Manufacturing Knee Type
- Milling Machine—Plain Bed Type, Horizontal Spindle Machines
- Milling Machine—Vertical, Knee Type (Not Including Bench Type)
- Polishing and Buffing Machine—Bench and Floor
- Profiling Machine—Vertical, Fixed Bed Type, Single and Multiple Spindle
- Tapping Machine—Vertical, Single or Multiple Spindle
- Thread Grinding Machines
- Thread Milling Machine
- Turret Lathe—Ram Type, Plain and Universal

EXPORT
SALES DIVISION

BELOW MARKET

NEW "FIXED PRICE" POLICY ESTABLISHED ON 31 TYPES OF SURPLUS MACHINE TOOLS

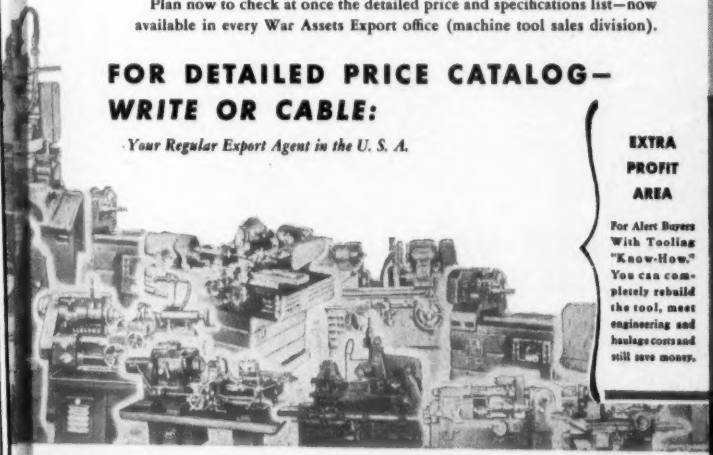
Here is good news indeed for the man who is trying to purchase general purpose production tools for replacement, reconversion or new enterprises. Now you can go into any of War Assets 11 Export Offices, any machine tool site sale in the United States, or any approved War Assets Administration dealer and buy at the same fixed price, everywhere, the tools in these 31 groups listed at the left. No waiting for complicated figuring of prices, checks against priorities or other delaying factors. The tools are available in such quantity that *your purchase can be cleared on the spot,* and immediate delivery arranged.

But even more important is the principle under which the new low prices have been set. As the scale at the right indicates each price takes into consideration your costs of rebuilding the tool to new condition, engineering, service, etc. It is set well below the current market price for similar equipment sold on a full service basis. The differential is approximately 25% below market—enough for men with tooling "know-how" to realize a neat "extra" profit and at the same time acquire modern machine tools.

Plan now to check at once the detailed price and specifications list—now available in every War Assets Export office (machine tool sales division).

FOR DETAILED PRICE CATALOG—
WRITE OR CABLE:

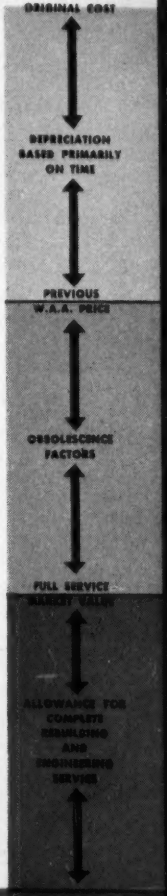
Your Regular Export Agent in the U. S. A.



EXTRA PROFIT AREA

For Alert Buyers With Tooling "Know-How." You can completely rebuild the tool, meet engineering and haulage costs and still save money.

W.A.A.'s NEW PRICING PRINCIPLE



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WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED

EXPORT DIVISONS:

Instruct your United States buying agent to common-

Better Oil Refining Process

New low-temperature method of refining vegetable, animal, and fish oils increases the yield, improves quality, and reduces cost

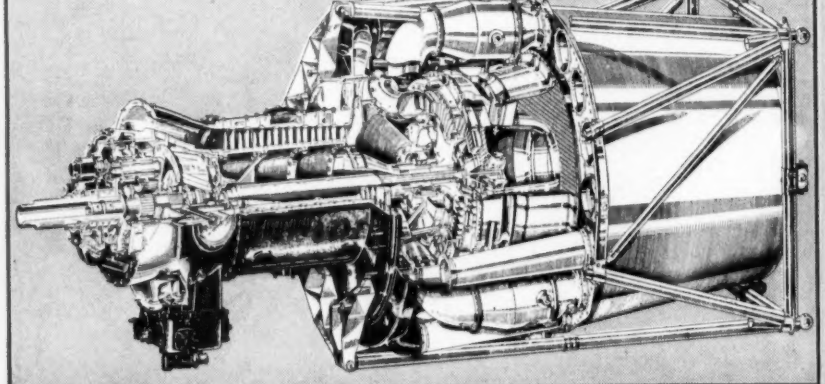
To improve the refining of vegetable, animal, and fish oils, W. M. Kellogg Co. has developed the continuous Solexol solvent extraction and fractionation method. Seven plants now under construction throughout the world will use it.

A cold-fractionation process, it employs a special grade of liquid propane as a solvent. At low temperatures, the solvent mixes in all proportions with glyceride oils. As the temperature is raised, the capacity to mix with oil components of high molecular weight decreases, and these components are precipitated progressively, permitting selective extraction.

Costs are said to range from a fraction of a cent to 3¢ a gallon of oil processed. Temperatures are lower than in most refining methods, preventing polymerization of oils and vitamin destruction.

Crude soybean oil can be separated so that 67.5% is edible; 30% is suitable for paints and other products; 1.5% contains color pigments in highly concentrated form, plus lecithin; and 1% is rich in sterols useful in synthesis of hormones and other pharmaceuticals.

With linseed oil, the yield is 98.5% of a light-colored, ash-free product. Further fractionation produces extenders for tung and linseed oils. Low-grade tallows



EFFICIENT TURBOPROP — Equipped with a heat exchanger, the Bristol Theseus I turboprop has a fuel consumption comparable to that of reciprocating engines at 20,000 ft., 300 mph. It was developed especially for long-range, 300-400-mph. transports. Air flows through following units in order named: axial compressor and centrifugal compressor, where overall compression ratio is 5:1 at 20,000 ft.; heat exchanger, which uses exhaust gases to raise air temperature; combustion chambers; two-stage turbine driving compressor; independently mounted single-stage turbine driving propeller; hot side of exchanger to exhaust nozzle. Speed ratio of two turbines is maintained by controlling propeller pitch. Centrifugal compressor efficiently transfers air from small axial unit to larger heat exchanger and has wider operating range than axial unit, if not as efficient. Specifications: length, 106 in.; dia., 48 in.; dry wt., 2,130 lb.; propeller speed (max. power), 1,070 rpm.; power (static), sea level, 1,950 bhp. +500 lb. jet thrust; fuel consumption, max. power, SL, 0.57 lb./equiv. bhp./hr.

and greases can be refined to yield 99% premium white products for soaps. Fatty acid color bodies are removed in a 2.5% fraction, and the 97.5% of decolorized material may be separated into stearic and oleic acids.

Starting with low-vitamin sardine body oil, a concentrate (9% by wt.) is obtained which has 3,500 units of vitamin A and 1,000 of vitamin D per gram. Besides, 47% of the crude emerges as an extender for linseed oil, 35% as a tung oil extender, 5% as stearine for edible products, 1% as fatty acids, 3% as color bodies.

Fractionation of shark liver oil gives a vitamin A concentrate with 500,000 units per gram (16 times potency of crude), this comprising 5.6% of the crude by weight. Another 1.4% is separated as stearine, while the residual oil may be marketed as a drier. —BUSINESS WEEK

Electronic Safety for Ships

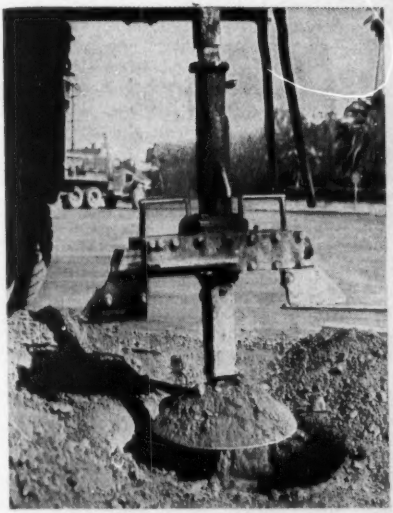
"Queen Elizabeth" can speed through iceberg zones with visibility zero. Ship has radar, loran, Gee, depth sounders, and comprehensive radio installation

Electronic equipment which helped the "Queen Elizabeth" to dodge submarines so successfully during the war now is contributing to the safety and speed of her peacetime trips as a luxury liner. Full speed is permissible when visual observation is impossible, even in iceberg zones or heavily travelled shipping lanes.

American Loran equipment makes long-range navigation accurate, and British Gee apparatus (also a radio pulse-timing system) supplements it in precise position determination at short ranges. One British search radar explores the surface 10 miles ahead of the ship; a second one ranges 50 miles.

In shoal waters, echo depth-sounding equipment "watches" for hazards. This provides, on an indicator alongside the helmsman, exact depth readings in large neon-illuminated numerals. It simultaneously produces a continuous and permanent record of ocean-bottom profile.

There are four remotely located main radio transmitters on the superliner, and the main radio room has four operating positions. Speech scramblers insure privacy of personal radio-telephone calls to shore. For emergencies, there is a complete radio station that is independent of the ship's power supply. A low-power radio set in the wheelhouse enables the captain, navigating officers, and pilot to converse directly with personnel on tugs or quayside when docking.—ELECTRONICS



DIGS CONICAL HOLES—Designed to cut conical-shaped holes for concrete transmission-tower footings, this undercutter will do in 5 min. a job previously requiring 2 hours of hand labor. Splined shaft extends undercutting blades on pressure from auger rackbar. A 24-in. dia. hole is first bored to batter of tower leg. —ELECTRICAL WORLD

Gas Turbine Now Economical

Competes commercially with other prime movers for certain applications. Low oil-coal cost ratio favors it in many places

Now commercially competitive with other prime movers for certain applications, the gas turbine is being built on firm orders in Switzerland in sizes up to 10,000 kw. for standby and peak-load service. Bunker C fuel oil is available in many parts of the world at lower cost per Btu. than coal or any other fuel. Where coal is less expensive than fuel oil, new-type gas producers, now under development, may lead to applications of gas-fired turbines, although such plants still appear relatively expensive. Experiments now under way aim at direct firing with coal, but definite results will not be known for some time.

For stationary power use, gas turbines have first appeared as standby or peak-load plants, where fuel cost has not been the determining factor. Where number of service hours is small, initial cost has been the determinant, the gas turbine offering the least plant cost. The gas turbine has the advantage of quick starting (5 min. from rest to full load), small space, low weight (45-60 lb. per kw.), simple attendance, and low maintenance costs. No cooling water is required for sizes up to about 6,000 kw.

Having no reciprocating parts, the gas turbine needs no heavy foundation. Only auxiliary apparatus is starting motor and electrical supply. Regulation is simple, with a constant-speed governor controlling fuel flow to vary temperature with load. Since speed and weight of air flowing remains practically constant at all loads, almost instantaneous power variations from zero to full load are obtained.

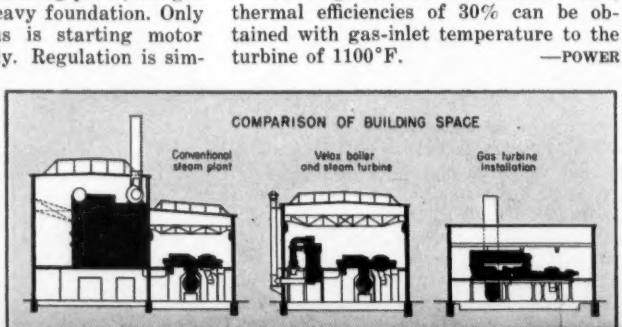
For 6,000 to 10,000-kw. sizes, intercooling between two compression stages is advantageous. Power to the compressor is somewhat reduced and output for same weight of air is increased, reducing fuel consumption.

With an intercooler, the gas turbine plant requires only about half the volume of air for the same power output as the single-stage unit. The output limit at 3,000 rpm. (50-cycle electric generation) is now about 10,000 kw. Thermal efficiency is about 21% at full load. If an intermediate combustion stage can be utilized, the useful power output can be increased and thermal efficiency improved to about 23% at full load.

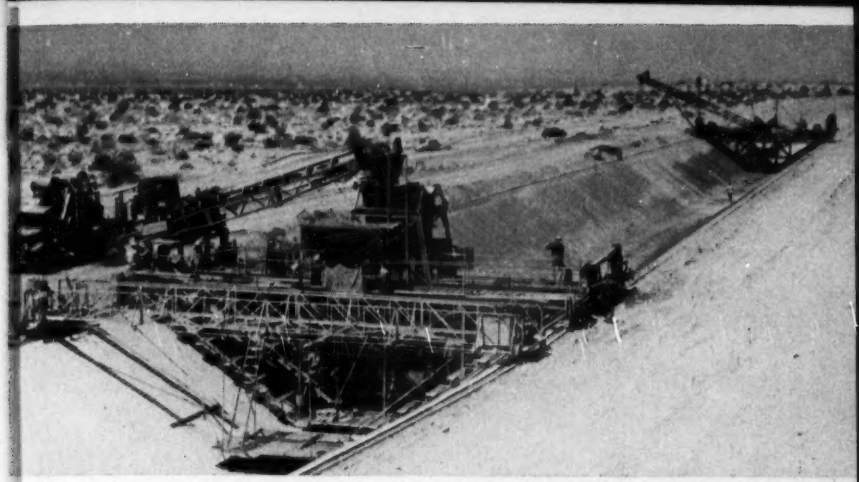
While the cost is appreciably below that of a comparable steam-turbine plant, the latter has better thermal efficiency, restricting the gas turbine principally to standby and peak load plants.

With regenerators of sufficient size, thermal efficiencies of 30% can be obtained with gas-inlet temperature to the turbine of 1100°F.

—POWER



Comparison of building-space requirements and construction for equal output of conventional steam turbine plant, steam turbine with a Velox boiler of typical European design, and single-stage standby or peak-load gas turbine.



Paving machine, foreground, receives concrete from truck mixers. Under hopper, distributing car receives concrete. Trimmer, extreme right, precedes liner for fine-grading of canal bed.

HIGH EFFICIENCY IN CANAL CONSTRUCTION

In constructing a 145-mile canal through California's Coachella Valley, contractors made field improvements to trimmers and liners to increase efficiency. Lower 55 miles of canal is concrete-lined, with bottom widths varying from 6-12 ft. and with side slopes of 1½:1. Lining is 3½-in. thick concrete, reinforced with wire mesh. Canal was roughly sloped by excavating and filling machine, doing no fine grading.

Trimmer used was of bucket excavator type, one bucket system on each side. Belt conveyor deposited soil on one bank only, providing a 25-ft. dike. Trimmer, electrically operated throughout, powered by a diesel-electric generator, is well suited to soil free from boulders, shale, or sandstone. Hydraulic jacks at supports allow operator to make cut adjustments.

Paving machine, liner, also electrically operated and self-propelled, has hydraulic jacks to regulate machine grade. Concrete, from truck mixers, is delivered to hopper in center of machine by conveyor belt; distributing car, beneath hopper, delivers concrete to various sections of lining. To maintain wire mesh reinforcement at specified depth, two pipe guides, or templets, held in position transverse to centerline of canal, one above and one below the mesh, are used. Concrete is finished by hand from platform behind machine.

TEXTILE EXPANSION $298,000,000 IN 1946

Expansion and improvement in the U. S. textile industry during 1946 was estimated at $298,000,000 compared with a prewar figure of $87,670,000 for 1939. Improvements will include general industrial equipment as well as strictly textile machinery. Synthetic fiber producers began construction of new plants valued at $125,000,000 during the past year. Cotton mills have not spent proportionate share, probably through fear of unfamiliar synthetic fibers. —TEXTILE WORLD

NEW COLOR TELEVISION

All-electronic color television has been developed by Radio Corp. of America. Three kinescope tubes receive separate signals representing the three primary colors—red, blue, green—and transmit them simultaneously to the viewing screen as a composite picture. Columbia Broadcasting System previously announced a mechanical system of introducing color into television.—BUSINESS WEEK

LIGHT ON UN—Soft white light will cover entire 6,000-sq. ft. white acoustical-tile ceiling in each of two large United Nations auditoriums at Lake Success, L. I., yet light intensity will be 55 ft.-candles at reading level. Closely spaced rows of low-brightness fluorescent lamps are above white enameled crossing louvers forming 10-in. openings 6-in. deep which cut off direct view of lamps to about 30 deg. There are 500 of the 60-in., 40-watt, T-17 fluorescents in the 4,500° white color, 12 in. below 17-ft.-9-in. ceiling. Louvers, 15 ft. above floor, are removable in 2½x5½-ft. sections for maintenance. —ELECTRICAL WORLD

MORE ON FUSION-PIERCING OF HARD IRON ORE

Additional information has been released on the revolutionary new fusion-piercing method of cutting vertical blast holes in mining (McGRAW-HILL DIGEST, Dec. p 7). In tests by Linde Air Products Co., a total of 450 ft. of 6-in. hole has been pierced in hard Mesabi taconite by 4,000°F. flame from a rotating blowpipe, using oxygen and a flux-bearing petroleum-base fuel, fed through a multiple-port burner. The intense heat spalls and/or melts the rock, the combustion gases blasting the material from the hole bottom and up past a rotating water spray above the burner tip. Both molten and spalled materials are embrittled by the quick quench and are reduced to fine cinders or chips which are carried out of the hole by the fan-exhausted gases and steam.

Thermal stresses develop radial cracks around the hole, facilitating fragmentation in primary blasting. This, together with speed in blast-holing, will lead to lower ore costs. Tendency of holes to enlarge, as cherty layers of banded structure are pierced, produces corrugations which will permit the placing of split charges or other effective distribution of explosive to reduce explosive cost. Lack of major wearing parts in fusion-piercing equipment also cuts cost.

In cutting the hole, an 8-in. shell, with hard-faced blades, is mounted immediately above the burner tip to loosen slag from the sides of the hole. The field equipment, resembling a portable well rig, is mounted on a truck. The blowpipe, which replaces the kelly in the drill rig, is suspended from the headsheave by a steel cable attached to a single-drum winch. Electric motors raise, lower, and rotate the blowpipe, being operated from an instrument panel. A reasonably capable worker can become a proficient operator quickly. —ENGRG. & MINING JOURNAL

SCIENTIFIC MANAGEMENT HELPS SMALL COMPANY

Often believed applicable only to large corporations, scientific management principles have been adopted by Tri-Clover Machine Co., employing only 225 men and making 6,000 different parts for food and chemical equipment industries. Overall plant efficiency was increased 70-117%, wage rates became highest in area, production costs dropped. Basic results: profits to workers, company, and customer. Principles were applied in areas of employee relations, production, and management control. —FACTORY

NEW TEXTILE MACHINERY TO CUT PRODUCTION COST

U. S. textile manufacturers are in the midst of their greatest machinery-buying program. They intend to cut production costs, greatly increased by worn-out machinery. New high-speed cotton looms are expected to save between $110-155 per loom per year, will be amortized in 6-10 years. Overhead traveling card room ceiling cleaners will save about $1.50 per operating hour. Automatic winders should save 35-40%; new spools and bobbins will pay for themselves almost immediately; slasher-control instruments are saving 10-20% over old equipment.

Woolen and worsted manufacturers feel new machinery will pay for itself in as little as 4 or 5 years. New worsted cards double poundage of older cards; new blending systems reduce costs 50-70%; new looms will save initial cost in possibly two years. —TEXTILE WORLD

UNIQUE USES FOR JETS

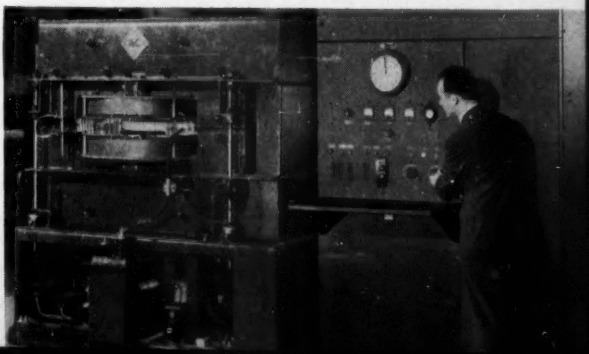
Aerojet Engineering Corp. is predicting wide use for its rocket products in the peacetime world. A 150-lb. rocket-jet turbine, less than 1 ft. in dia., produces 240 hp. Jet power for starting and stopping heavy machinery is a definite possibility, since some turbines take 1,500 hp. to start them but need only 500 hp. for continued operation; rocket booster for starting would cut power plant size two-thirds. Breaking action of forward-shooting rockets could halt trains traveling 75 mph. in 360 ft., as against 1,450 ft. for friction braking. Rocket power has been tested for extricating mired trucks and to aid trucks up grades. —SCIENCE ILLUSTRATED

TURBINE-BOOSTED ENGINE HAS IMPORTANT ADVANTAGES

Compounding the reciprocating aircraft engine with a crankshaft-mounted turbine driven by high-pressure exhaust gases is seen as a significant new development. Test data indicate that it may provide enough margin in performance to supplant the pure gas turbine in certain types of aircraft. While the higher back pressure required in the engine exhaust will reduce piston power output, the turbine power will be 4 to 5 times that loss.

Lowest specific fuel consumption of the compound engine almost coincides with the most efficient propeller speed. Effect of altitude on performance is extremely favorable. Ratio of specific thrust to weight is markedly better than that of conventional engine.

Because of high temperatures, turbine parts must be of improved alloys, and the high pressure requires stronger, tighter exhaust manifolds. —AVIATION



X-RAYS 24-IN. STEEL—Internal flaws in billets, forgings, castings, and weldments up to 24-in. thick are revealed by x-rays from the 20,000,000-volt betatron built by Allis-Chalmers. The betatron is a variant of the shell-type transformer, an evacuated "doughnut" tube being substituted for the secondary winding. Electrons are injected into the tube and accelerated in an orbit by a series of timed impulses from the electromagnetic field. When they are traveling at about the speed of light, their path is shifted by electromagnetic force so that they strike a target. X-rays emerg . —AMERICAN MACHINIST.

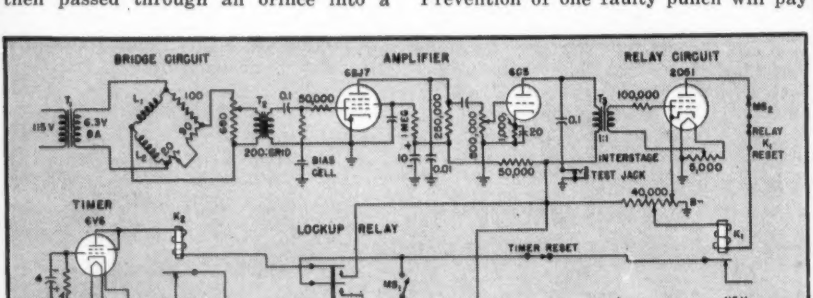
New Uses for Phototubes

Actuate bar cut-off tool, control reel motor, detect pinholes in sheet metal, translate charts, check viscosity, protect presses, and fold cloth

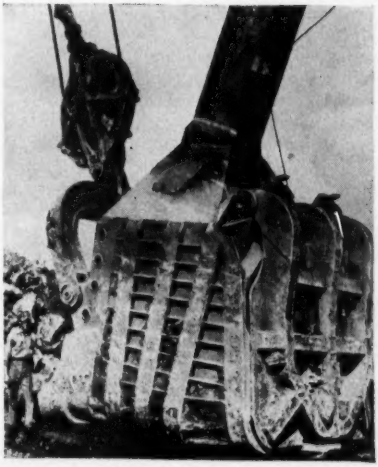
Extruded soft bar material activates a photoelectric relay which controls a solenoid valve that admits air to actuate a cut-off tool . . . To maintain slack loop between pay-off reel and processing machine, as in steel or paper mills, a sheet of light is directed on a bank of phototubes, part of the light being cut by loop. As the loop deepens, less light is cast on tubes, actuating the photocells to control field of dc. motor driving reel and vary speed of reel . . . Pinholes in sheet metal to be used as food and beverage containers are spotted by photoelectric detectors as metal travels 1,000 fpm. on mill.

As a check on viscosity of spray enamel, in systems that collect it for reuse, samples are caught in a small cup, then passed through an orifice into a measuring chamber. Liquid or float interrupts light beam when chamber is filled, actuating a photoelectric relay. A second timer is designed to "time out" in 1½ min. If viscosity is too great, timer operates before relay, injecting solvent into enamel-reclaiming system. Check is made every 15 min.

Photoelectric equipment translates data from moving strip of paper and converts information to an electric signal that controls speed of motors, valve openings, and other mechanical adjustments . . . Automatically fed, multiple-die, forming presses are protected photoelectrically from severe damage by faulty movement of metal. Mounted on each side of conveyor, the phototubes "watch" it and shut down press if piece is not moving. Prevention of one faulty punch will pay



PUNCH-PRESS PROTECTOR—If metal slugs are not ejected from the dies of a punch press within 3 sec., an electronic timer used by Norris Stamping & Mfg. Co. stops the press and avoids damage. Discharging through a funnel and tube, the slugs pass through coils, L_1 and L_2, which are reactance arms of a simple bridge circuit. The slugs unbalance the bridge, and a voltage appears across the primary of transformer T_2, this being tetrode (right), which fires and opens the contacts of relay K_1. Switch MS_2 is opened by the press stroke and reactivates the sensing circuit. Switch MS_1 is closed momentarily by the punch press cycle, so if K_1 is not opened by slugs the circuit is completed through coil of relay K_2. This closes the plate and cathode circuits of the timer, which will operate K_2 and stop the punch press unless relay K_1 becomes energized within three punch



WORLD'S LARGEST SHOVEL—This 40-cu.-yd. shovel dipper was built by Marion Power Shovel Co. of new, war-developed steels, dipper and handle weighing 30,000 lb. less than previous materials of same strength. Larger dipper can be mounted on machine previously employing a 35-cu.-yd. dipper without adding front-end weight, even when loaded. Dipper is to be used in coal excavation. —COAL AGE

for installation . . . Cloth coming from automatic ironer, too hot to handle, can be folded by air stream, controlled by photoelectric equipment. —FACTORY

TRANSFER MOLDING IMPROVES PLASTIC PARTS

Where fragile inserts, high dimensional accuracy, and low original mold cost are factors in plastic products' design, the comparatively new transfer molding method is better than compression molding. Heated to plasticity in a chamber, a measured quantity of thermosetting plastic is forced by a ram into the mold cavity. Under sustained heat and pressure, the material polymerizes and becomes rigid.

Uncured granules are not found in the finished product because all crystals are thoroughly broken up. This gives a electrical, physical, and chemical-resistant properties by about 10%. Little "flash" is formed where the mold halves come together, because the mold is closed before process begins. —PRODUCT ENGRG.

PACKAGED RUNWAY LIGHTS

Low-cost, ready-to-plug-in runway light packages are now being produced by American Gas Accumulator Co. for night lighting of small airports. Height of light is variable, and unit is of breakable fiber or aluminum construction with sufficient frangibility to shear and not damage plane if hit. Prefabricated package, costing from $1 to $1.30 per runway foot, includes: regulator, cable ready for installation at 200-ft. intervals, insulating transformer (for underground burial), aluminum core, light receptacle, clamp, light and reflector, and positioning stakes.

Two or three men, with plow, can bury 4,600 ft. of cable in an 8-in. trench in two days; lights can be installed in half an hour each. —AIR TRANSPORT

ADJUSTABLE FLOAT BRIDGE

To accommodate a 40-ft. fluctuation in river stage, a 1,627-ft. floating bridge providing a 22-ft. roadway across the Irrawaddy River has adjustable piers near each shore, permitting horizontal and vertical movement of the trusses. The steel barges supporting the box trusses over the main channel have such a large displacement per inch of depth that their yielding under traffic is not sufficient to overstress the trusses. Spanning between the two 42-ft.-high steel-frame towers at each end is a floorbeam built up of two 24-in., 74-lb. sections and supported at either end by crossbeams pin-connected to the inner tower legs. By means of a 30-ton chain hoist, the floorbeam may be supported while the pins are being shifted to the desired position for a given river stage On top of the floorbeam, a 12-in. roller under each line of trusses permits longitudinal movement. A cable anchorage permits removal of center span to accommodate

BOTTLED ORANGE JUICE DELIVERED DAILY

Deliveries of high-vitamin orange juice are now made daily by Foremost Farms, Inc., in 12 towns and cities of the South. The juice is prepared daily from a concentrate. The latter is made from selected oranges and blended to produce uniform taste. The juice is extracted, deaerated, partially deoiled, sterilized, concentrated under high vacuum at low temperature, packaged, and cooled in a continuous high-speed operation. Tests show oil content of 0.0025-0.0030% gives best flavor; too much oil gives strong, rancid flavor; too little tastes flat.

Stored at 45° F., the concentrate will keep indefinitely. Foremost adds water in ratio of 7:1 for reconstituting juice. Delivery is in quart and half pint milk bottles. Assays indicate 99% of vitamin C of fresh orange is retained and over 90% of original food elements are present in reconstituted juice standing over 24 hours. —FOOD INDUSTRIES

PLANT USES TELAUTOGRAPH

Combining quick delivery, taxi, truck, and railway service through the production and storage areas of a 5 million sq. ft. plant, the trucks, tractors, and trailers of the B. F. Goodrich Co. are directed by a dispatcher and telautograph system. A request for haulage telephoned to the dispatcher is relayed by telautograph to the appropriate one of four stations in the plant. The foreman then sends the most convenient vehicle of the type required.

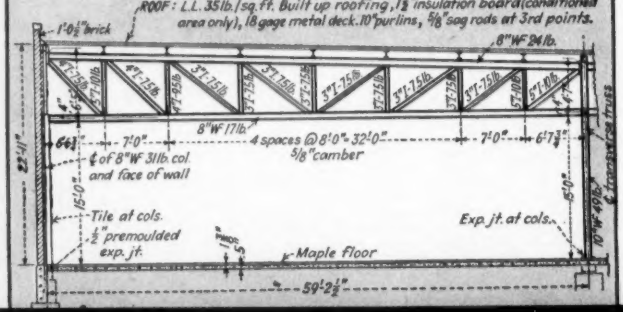
A two-way public address system, connecting headquarters and transportation department, directs the company's outdoor fleet of trucks, making prompt delivery possible. Well-equipped repair shops and skilled personnel prevent delays in maintenance. —FACTORY

PENICILLIN SYNTHESIZED

After 3 years of research, Cornell University, has succeeded in synthesizing penicillin G. The achievement indicates the possibility of manufacturing entirely new penicillin products. Through synthesis, variations in product, resulting from fermentation method, are eliminated. —BUSINESS WEEK

FREEZEPROOFING COAL

In tests for freezeproofing coal for winter shipment, Dow Chemical Co. has used a 32% solution of calcium chloride to treat over 1,000,000 tons experimentally. This is a higher concentration than necessary for good freezeproofing, but Dow feels numerous advantages are gained from use of this chemical. Actual quantity of chemical necessary to properly freeze-proof coal depends on: surface moisture of coal, size, temperature in transit, and amount of precipitation while coal is in cars. —COAL AGE



PRACTICAL PLANT ROOF — Composed of rolled beams with webs vertical, H-trusses as used in roof framing for new General Electric factory permit locating suspended loads without panel point limitations. Welded steel, 40-ft. jack trusses are used with 60-ft. trusses to provide maximum unobstructed space.—ENGRG. NEWS-RECORD.

What's New In Aircraft

"Rainbow" will fly 413-440 mph.; thermal deicing for XB-36; new flying automobile; advanced personal planes; trimotor work-horse transport

Previously estimated at 400 mph., cruising speed of Republic Aviation Corp.'s *Rainbow* transport will be between 413-440 mph. for flights of 3,000 miles or less . . . Consolidated-Vultee's XB-36 will incorporate thermal deicing, engine air passing through exhaust-gas heat exchangers and ducts between double skin of wing and tail-assembly leading edges. Exhaust air also will deice pilot and bombardier enclosures and gun blisters, between layers of glass . . . *Plane-Mobile*, auto designed to fly, has aerodynamic control of a so-called floating wing. Gull-wings, pivoted on Oilite bearings at strut and fuselage connections, are free to assume angles of incidence indicated by aerodynamic forces produced by ailerators. Still awaiting flight test, the plane is fabric covered and develops 70 mph. in air and on ground. Split-surface air brake is built into horizontal stabilizer and controlled from cockpit . . . Culver Aircraft Corp.'s new Model V, 2-place, 85-hp., all-wood, personal plane flys 132.5 mph. at 4,000 ft., ranges 700 miles, uses Culver's "simpli-fly" control principle—interconnected flaps and movable stabilizer for automatic trim of plane.—AVIATION NEWS

Recovered sufficiently from war damage to start production, N. V. Nederlandsche Vliegtuigenfabriek Fokker is introducing a 4-seater plane with twin tail booms, pusher propeller, and the cabin ahead of low, cantilever, all-wood wing. Fuselage is wood with metal nosepiece. Detachable panels provide accessibility to power plant, a 190-hp. Lycoming 0-435A or a 185-hp. Continental E-185. Tail-booms and vertical fins are metal; stabilizer, elevator, and rudders are made of wood with fabric covering. Top speed is 135 mph.; range, 530 miles; landing speed, 56 mph. —AVIATION

Northrop Aircraft, Inc., has developed a trimotor transport, the *Pioneer*, for short-haul freight, primarily for Latin America. It is designed to clear a 50-ft. obstacle in 1,600 ft. with 10,600-lb. load on two engines. Brakes and flaps are only hydraulic parts, fixed landing gear reducing maintenance costs. Belly hatch permits loading of freight up to 36 ft. in length. Plane can take off in 450 ft., land in 600 ft. —AIR TRANSPORT

GYRO-GLIDER—Built by General Electric Co., this single-place, gyro-glider weighs but 120 lb. yet lifts nearly 300 lb. Lift is developed by two 9-ft. rotary blades, set in motion by air resistance as craft is towed. The glider requires a 60-ft.-dia. landing area. —AVIATION NEWS

DESCALING FURNACE

To eliminate sand blasting or chemical pickling of heat-treated parts before machining, Dana Corp. is using a lithium-atmosphere descaling, heat-treating furnace at cost of 65¢ per ton of work. Automatically controlled, the 90-ft. furnace, with radiant tubing and double conveyor system, will handle 4,000 tons per hour. —BUSINESS WEEK

ELECTRONIC VIBRATORS TEST HEAVY STRUCTURES

Two electromagnetic shakers, each exerting 45 lb. of force, bounced a 30-ton airplane (DC-7) vertically on its landing gear in structural testing. This demonstrates the tremendous mechanical forces developed through resonance, the mass of the plane and the compliance of the tires resonating at 114 cpm.

In addition to eliminating the brute force required in a mechanical vibrator for testing structures, the electromagnetic device provides flexibility and control over the forces applied, and it completes a fatigue test more quickly. For instance, a resonant force of 200 lb. may be exerted alternately in tension and compression on a sample structural member for 80,000 cycles in 2 hr. With 10-cpm. motor-driven, cam-operated apparatus, test would take over 100 hr.

Consisting of an armature coil suspended in the air gap of a magnetic circuit operated at high flux density, the shaker is energized by a vacuum-tube oscillator and power amplifier. It weighs 225 lb., can exert a 150-lb. force, has a frequency range of 120 to 30,000 cpm. Frequencies down to zero can be obtained by substituting a motor-driven sine potentiometer and battery for the vacuum-tube oscillator. —ELECTRONICS

PISTON-RING TESTER—Recording measurements from 18 Solex gages, or airfingers, in 18 columns of mercury, this Gulf Research & Development Co. tester gives speedy, accurate readings on airplane piston rings in 15 sec. Adaption to automobile piston rings now is being studied by Gulf. —AIR TRANSPORT

STOPLIGHTS FOR PLANES

To supplement overburdened ground-to-plane communications, aerial traffic lights are being installed at Chicago Municipal Airport at cost of $50,000. To control taxiing planes and those about to take off, there will be an array of five lights on the front of a signal house at each end of each of the nine runways. Two lights on the back of the signal house, visible for 15 miles, direct incoming traffic. —BUSINESS WEEK

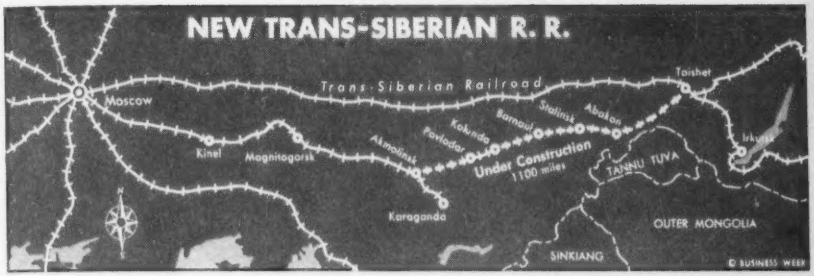
TOUGH SYNTHETIC TEXTILE

Now under investigation by Imperial Chemical Industries, London, a new synthetic textile fiber, called Terylene, is resistant to light, heat, microorganisms, acids, organic solvents, and bleaching agents. It has low moisture absorption, high wet strength, and good resilience. Its high initial elastic modulus should permit it to be woven or knitted readily, and the fabric can be ironed, laundered, and steam-pressed. Dyeing problems are being studied.

Terylene is produced from a polyester derived from terephthalic acid and methylene glycol. —CHEMICAL ENGRG.

UNUSUAL STADIUM

Built in the form of an ellipse with 400- and 350-ft. axes, an 11,000-spectator stadium in Switzerland carries its roof on four columns. These support in a transverse direction two main 300-ft.-span trusses into which are framed (offset from columns) two longitudinal 183-ft. trusses. Framed in latter trusses are four transverse trusses, each 224x16-ft. The top joints of three columns permit horizontal truss movement, thus elim-



RAILS ACROSS SIBERIA—Before the war, the Trans-Siberian railroad reached as far as the Karaganda coal fields. But Russia's 1946-50 Five Year Plan calls for extension of the road from Akmolinsk to Taishet. The Far Eastern line to the Pacific, north of Lake Baikal, is said to have been completed. —BUSINESS WEEK

inating dangerous horizontal load pressures. Exterior walls are carried on movable supports, isolating the stresses due to deformation of building framework. Ceiling of asbestos sheet hides most of roof framework. Roof is lightweight concrete resting on timber purlins. Of the total supported weight of 2,528 tons, 600 tons is carried by the walls. —ENGRG. NEWS-RECORD

NEW AIR-ENTRAINING ADMIXTURE APPROVED

Air-entraining admixtures have been approved for use in highway construction by the Public Roads Administration. These agents produce tiny air bubbles in concrete at mixing, lubricating mix, adding workability and plasticity, and possibly providing expansion space for water during freezing weather.

Vinsol resin, made by Hercules Powder Co. from pine resin, is in flake or powder form. About 0.010% by weight of cement is proper mixture; cost is about 5½¢ per lb. in carload lots. Concrete should contain 3-5% entrained air. Darex AEA, a Dewey & Almy Chemical Co. product, is a triethanolamine salt of sulphonated hydrocarbon. One fluid ounce per sack of cement gives 3-5% entrainment. Cost is about ½¢ per sack of cement. Pozzolith is a mixture of calcium lignosulphic acid, calcium chloride, and pozzuolanic material. One pound per sack of cement increases air-entrainment 2½%. It costs about 6¢ per lb., is made by Master Builders Co. —ENGRG. NEWS-RECORD

ELECTRICAL INNOVATIONS

Combining heat from an infrared bulb with massage effect produced by rubber rollers, the Roll-A-Ray introduced by A. O. Sutton Corp. provides relief from tired, aching muscles . . . New 1,200-watt self-turning, self-basting broiler-roaster developed by Rotiss-O-Mat Corp. cooks steaks or poultry. Completely automatic, the nickel-plated roaster has removable, aluminum drip pan, stainless steel skewer, and nichrome resistance heating element. —ELECTRICAL MERCHANDISING

The Air-D-Lux 1,700-watt heater-fan is claimed to raise the temperature of an average room 20° in 18½ min. With heating element off, fan serves as ventilator. Turned on its back, it becomes a hotplate. Warren Simpson Corp. makes the product. —BUSINESS WEEK

LIGHTWEIGHT BUS

New model Fitzjohn Coach Co. 28-passenger, intercity bus, "Duraline", uses single-unit construction, the body and chassis being an integral unit, with aluminum side panels welded to frame. Raised seat platforms house hot air ducts, outlets being under each set of double seats. Hot water heater fan, in left side platform, circulates 350 cfm. of air. Hercules engine develops 131 hp., permitting 65-70-mph. —BUS TRANSPORTATION

Modern Methods in Mining

Output raised six tons per man-shift through improved labor relations, efficient management, effective maintenance, and larger cars

Improved labor relations and modern methods have raised the per man-shift output of Piney Fork mine from 8 to 14 tons. Complete mutual understanding between management and labor and within the ranks of management has been reached. Chain of command is strictly adhered to and no one is bypassed. Visits by workers to superintendents are encouraged, but not for carrying complaints, unless worker is accompanied by intermediates in the command chain. Management has evolved the theory that miners will produce if conditions are right, and that it is management's responsibility to make conditions right.

Safety is held a keynote of production, so man-trip cars have been steel incased. These cars have ventilators at each end and a sliding, solid or perforated door on clearance side. Each worker has an assigned place in car; each trip-train includes two tool and equipment cars. Areas being worked are limited to reduce stops. Trains carry in one shift and remove another on a three-shift work schedule. Trip-cars are parked inside mine between trips to maintain more even temperatures for miner comfort.

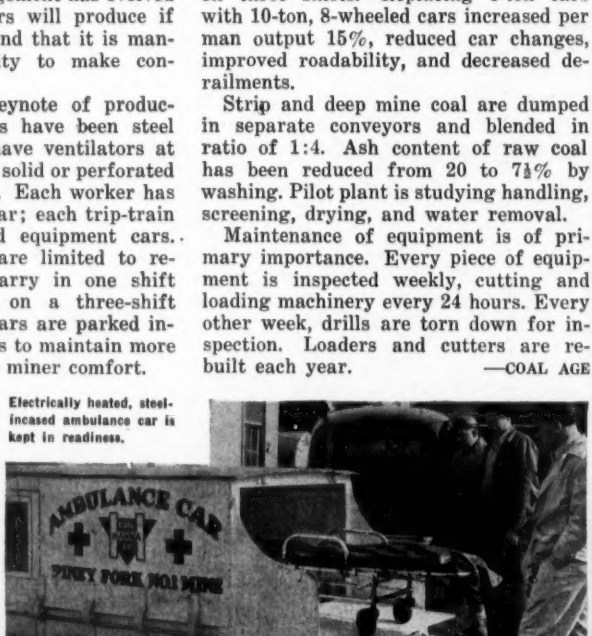
An electrically heated, steel-inclosed ambulance car is kept in readiness near foreman's office. Regular rolling ambulance cot eliminates second and third handling of victim. Wide use is made of in-mine signs, legibly lettered on Plasticele, illuminated from behind, to mark fire-extinguisher stations, rock-dust stations, entries, and escapeways.

No cuts may be loaded unless area can be timbered immediately, and, if roof is exceptionally bad, rail bars are used instead of timber. Taking 12 to 14 in. of stone with coal has been found to leave a better roof for timbering, no attempt being made to separate coal impurities within the mine. An average of 8,225 tons of material, coal and impurities, is loaded daily by eight crews on three shifts. Replacing 4-ton cars with 10-ton, 8-wheeled cars increased per man output 15%, reduced car changes, improved roadability, and decreased derailments.

Strip and deep mine coal are dumped in separate conveyors and blended in ratio of 1:4. Ash content of raw coal has been reduced from 20 to 7½% by washing. Pilot plant is studying handling, screening, drying, and water removal.

Maintenance of equipment is of primary importance. Every piece of equipment is inspected weekly, cutting and loading machinery every 24 hours. Every other week, drills are torn down for inspection. Loaders and cutters are rebuilt each year.

—COAL AGE



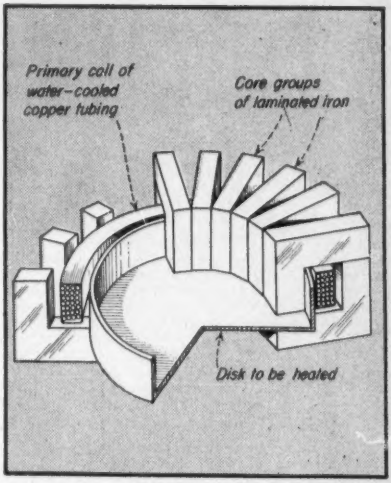
Electrically heated, steel-incased ambulance car is kept in readiness.

60-CYCLE INDUCTION HEAT HAS ITS USES

Low in first and maintenance costs, of higher thermal efficiency than high-frequency units, 60-cycle induction heating was used much during the war for expanding parts for shrink-fit assemblies, as well as for large-caliber-shell nosing operations. It heats extrusion dies and nozzles and melts metal in the wrought brass industry.

A 125-kw. unit has been designed to heat to 1,200°F. in 6.5 sec. the 3-in. upturned edge on a 12-in. dia. dish-shaped piece of ⅛-in. mild steel (diagram), at 90% efficiency. Under construction is a 60-cycle heater, consisting of a pancake coil imbedded in slots in a laminated iron core, for ⅞-in. nonmagnetic chromium steel washers of 20-in. outside, 7-in. inside, dia.

Principal disadvantage of 60-cycle induction heating is the need for a laminated iron core on all but largest pieces. Difficulties in exactly locating such a core remove 60-cycle heating from competition with higher frequencies on most work. On small pieces, magnetic saturation of iron core prevents use of 60 cycles. —ELECTRICAL WORLD



Core and coil arrangement for heating rim of steel dish with 60-cycle induction unit. Upper core sections are fastened to a plate (not shown) and can be lifted to permit removal of work.

SHIPPING MOLTEN SULPHUR IN TANK CARS

Recent tests indicate that shipping sulphur in liquid state can be done without difficulty and has several advantages for suitably located customer. The tank cars used—8,000- to 10,000-gal. capacity—are provided with steam heating coils and lagged with 2 in. of insulation. The sulphur reaches the customer pure, dry, ready for use, is easily unloaded by gravity or pump.

Among the drawbacks to the customer are: the difficulty of maintaining a stockpile, and the revision of equipment to handle the liquid. As yet, little serious consideration is being given to the possibility of shipping liquid sulphur in ships. —CHEMICAL ENGRG.

SWEETER THAN SUGAR

Four thousand times sweeter than sugar, 1-N-propoxy-2-amino 4-nitrobenzene, developed during the war, is now being produced in the Netherlands under European patents and is in use as a sugar substitute. A benzene derivative, the new sweetening agent is a powdered orange crystal. Solubility in water is slight and it remains stable in boiling. Practice is to dilute it with lactose, providing a sugar substitute 500 times sweeter than sugar. —BUSINESS WEEK

GLUES MACHINES TO FLOOR

Mounting of heavy machinery on felt pads cemented to floor has reduced noise and vibration, maintenance time, and installation and moving time 75% at Berger Machine Co. Edges of pads are coated with cement to prevent soaking up of oil and water from floor. To move machines, pads must be soaked with alcohol, then sharp floor scraper will loosen cement contact. —FACTORY

TECHNICAL SHORTS

Wings of Glass—Glass-fiber airplane wings, 55% glass fiber, 45% resin, have passed strength test requirements at Wright Field, smoothness of surface offering possibilities of supersonic speeds. Strips of cellular cellulose acetate are wound with glass cloth; upper and lower halves are bonded laterally in molds by heat and pressure. —BUSINESS WEEK

Jet-engine Solder—Silver-magnesium solder (85-15%) was employed by the Germans in attaching hollow blades of the Junkers 004 jet engine to the turbine wheel; pin fastenings alone were not strong enough. Melting at 1790° F. and retaining high strength at 850° F., the solder might be used in fabricating stainless steel heat exchangers, exhaust manifolds, gas turbine parts, and general chemical equipment. —PRODUCT ENGRG.

Gas Masks Salvage Meat—To salvage $600,000 worth of condemned frozen meat, an Australian packer used 1,000 activated charcoal gas mask canisters to absorb ammonia odor from meat. Hot air removed ammonia, charcoal absorbed it. —FOOD INDUSTRIES

Electronic Heat Dries Cores—Where the oven method takes hours, foundry cores are dried in 30 sec. by electronic heating and have ideal color and texture. Cost for power is about $1.25 per ton of sand treated; tube cost, 8¢ per hour. —ELECTRONICS

Powerful Little Engine—Developed by Armstrong Siddeley Motors, Ltd., the Mambo propeller turbine develops 1,000 hp. plus 320 lb. of thrust. An axial-flow type engine, it weighs 750 lb., and is 27 in. long; overall length, including jet pipe, is 9¼ ft. —AVIATION NEWS

"Spot-Welds" Wood—With a $395, 1-kw., high-frequency heater, one man does the work of 3 in spot-tacking glued reinforcing wood strips to flat pieces at B. P. Johns Furniture Corp. The glue, set by h-f in 2 spots on each strip, holds pieces while remainder of glue dries. —ELECTRICAL WORLD

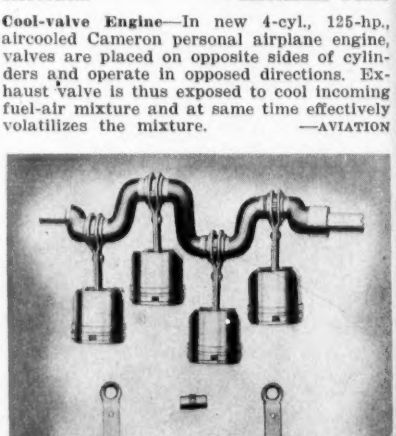
Selective Ear Stopper—A new ear protector has a floating plate which is forced against a shield to block loud noises, but permits low-intensity noises to pass. —SCIENCE ILLUSTRATED

Liquid Oxygen Boosts Power—By injection of liquid oxygen into fuel mixture of reciprocating aircraft engines, an increase of 400 hp. and 39 mph. was obtained at 28,000 ft. altitude; 200 hp. and 15 mph. at 35,000 ft. System weighs 200 lb. —AVIATION NEWS

Plastic Centrifugally Cast—Newest application of centrifugal casting is in forming phenolic plastic housings, handles, knobs, distributor adaptors, film reels, and radar parts. Experimental process involves spinning heated plastic-filled mold. —AMERICAN MACHINIST

Low-impedance Transformers Preferred—On radial-type electric power distribution systems, low-impedance (2.4%) transformers have definite, inherent advantages over those with higher impedance. They give better normal regulation and lower voltage fluctuations; substantially reduce investment in transformers and secondary conductors; result in less kva.—and a corresponding investment saving—in capacitors for power-factor correction. —ELECTRICAL WORLD

Cool-valve Engine—In new 4-cyl., 125-hp., aircooled Cameron personal airplane engine, valves are placed on opposite sides of cylinders and operate in opposed directions. Exhaust valve is thus exposed to cool incoming fuel-air mixture and at same time effectively volatilizes the mixture. —AVIATION



COMPACT-COMPRESSOR—Half conventional size, the new Pressure King air compressor has connecting rods and bearings which are fastened to crankshaft by slipping halves of pressed-steel rods over split bronze bearings and bolting rod pieces together. Bearing caps, shims, and lock washers are unnecessary. The 4 cylinders deliver 1¾ cu. ft. of air per min. at steady 60 psi. with a ½-hp. motor. A 7½-in. fan-flywheel moves air over cylinder and air cleaning chamber cooling fins. —PRODUCT ENGRG.

Lecithin Improves Creosote—Addition of lecithin to creosote or zinc sulphate solutions causes these wood preservatives to penetrate deeper. Putting it into inside enamel makes for smoother finish. —BUSINESS WEEK

Resin-treated Lags—Use of resin-treated lags on fulling machines in textile plants makes possible the use of softer, cheaper, more plentiful woods. Having better grip than previous rubber lags, curvature or bowing is almost negligible. —TEXTILE WORLD

Venturi-tipped Rotors—To delay stalling point in retreating blades of helicopter rotors, venturi tubes, mounted on tips of rotors, suck away air along upper surface of blades. Power to produce suction is about 2% of power to propel craft. —AVIATION NEWS

Freeze Unaged Beef—Tests by American Chemical Society of Chicago have proved false the old belief that beef should be aged before freezing to protect flavor. Results showed that flavor of aged beef deteriorates more rapidly while in storage than that of unaged beef. —FOOD INDUSTRIES

Water Removes Casting Cores—Sand cores are removed from castings with a high-pressure water stream at Cincinnati Milling Machine Co., the operation being carried out in a cabinet. Sand is introduced into the stream to increase cutting action, then sand is shut off, water washing casting clean. It is safe, easy, inexpensive. —AMERICAN MACHINIST

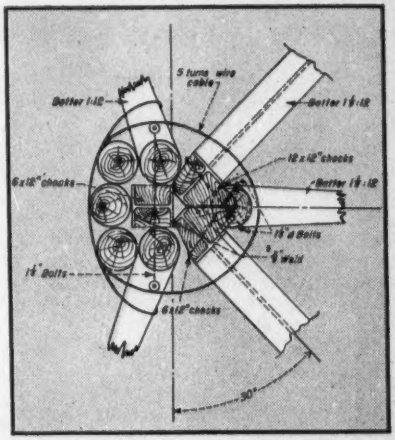
Silo Unloader—Motor-rotated sweep moves silage into center of silo and a blower picks it up and discharges it through a pipe to a cart on the ground. —ELECTRICAL WORLD

Plane Tiedown Net—Snarling of cargo nets in C-54's has been reduced through use of a net of 12-in. mesh of ⅜-in. signal quality rope. Nets are 10x17 ft., with tiedown points at 11-, 14-, and 17-ft. points; 4 to 5 nets required per plane. —AIR TRANSPORT

Blueprints as Templets—By making drawings and blueprints to full scale so that they may be used as templets for installation of switchboard equipment, California Electric Power Co. saves time and reduces errors in drilling panels. —ELECTRICAL WORLD

Revives Dead—Dr. V. A. Negovski, Russian scientist, successfully revived 4 dead soldiers at the front during the war and brought them to complete recovery. Of 48 still-born babies, 6 were brought to life for periods as long as 24 hours. Restoration process is by forced injection of blood containing adrenalin and sugar into arteries, plus artificial respiration. Speed is essential. —SCIENCE ILLUSTRATED

Passengers Fly Backwards—Air Transport Command reversed seats in a C-54 to test passenger reaction to flying backwards. ATC believes seat will offer added protection to passengers in emergency landing. No ill effects were noted. —AVIATION NEWS



COMPOSITE MOORING DOLPHINS—Steel-pile tripods, anchored in blasted but unexcavated bedrock, and 6 creosoted, wooden piles have been used at a saving of nearly $1,000 per cluster. Steel and wood piles are welded, bolted and cabled together, the timber piles fitted with steel driving shoes. —CONSTRUCTION METHODS

Metal Powder Hot-pressed—Metal powder is simultaneously resistance-heated and compacted by the new laboratory press of Diamond Hone Wheel Co., which has carbon dies and plungers. Hot-pressed 90-copper, 10-tin, 0.8-phosphorus spherical bronze powder has density of 8.519. —PRODUCT ENGRG.

Saves in Sewage Treatment—Using Cloroben, instead of chlorine, to sterilize sewage saved Los Angeles an estimated $180,000 in 5 months. The chemical, which has a phenol coefficient of 13, is a chlorinated benzene with two chlorine molecules in the ortho position and with added emulsifiers. It is made by Cloroben Corp. —CHEMICAL ENGRG.

Transparent Bearings—Oil colored with red pigment is fed into a transparent-plastic operating model of a newly designed bearing at Westinghouse and these observations made: how the seals work, whether the oil passages allow proper flow, whether relief points are located correctly. —AMERICAN MACHINIST

New Warping Creel—Bearings on bobbin supports of a Benniger warp creel are fitted with electromagnetic brakes to prevent turning when creel stops. Adjustment of yarn tension is kept constant from full to empty bobbins by feeler roller at top. Used for crepe yarns, creel may work with warping speed 4 times higher than other systems with revolving bobbins. —TEXTILE WORLD

How To Work Magnesium

Many new methods of fabrication developed and new applications of the lightweight alloys seen. Machining and casting properties good

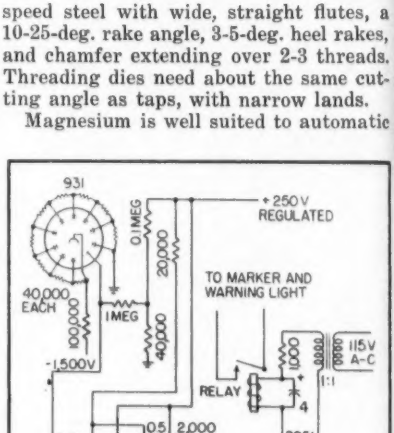
Applications of magnesium in fields other than aircraft are expected to increase. Magnesium alloys have been improved and many new methods of fabrication developed. The supply of raw materials is ample, and production capacity exceeds requirements, plants capable of producing more than 500,000,000 lb. a year having been built in the U. S.

Machining characteristics of magnesium alloys are excellent, and usually the maximum speeds of machine tools can be used with heavy cuts and high feed rates. Power requirements are about one-sixth those for mild steel. Tolerances need be only a few ten thousandths of an inch, and the finish is so excellent that grinding usually is not necessary. While cutting tools may be of the design employed for steel or brass, relief angles should be large in turning and boring (8 to 12 deg.), and allowance made for the quantity of chips produced.

Surface speeds as high as 9,000 fpm. are used in milling, although these are exceptional. Standard cutters are satisfactory if they have sufficient chip clearance, but it is better if the cutters have half as many teeth as for steel.

Magnesium sheet can be drilled with a standard 118-deg. point-angle drill, although 60 deg. is preferred because it prevents "walking," reduces thrust, and avoids abrupt change of thrust on breaking through. If the drill is so modified, the chisel-edge angle should be 120-135 deg. and the webb thin. A 10-deg. helix will help keep work from climbing. Reamers may be those designed for steel, but fewer flutes are advantageous. Counterbores should be ground similar to end mills, and may be high-speed steel or carbide. Standard taps can be employed in many cases, but for high production or close tolerances taps should be high-speed steel with wide, straight flutes, a 10-25-deg. rake angle, 3-5-deg. heel rakes, and chamfer extending over 2-3 threads. Threading dies need about the same cutting angle as taps, with narrow lands.

Magnesium is well suited to automatic



PHOTOTUBE METERS X-RAYS—High-speed automatic X-ray inspection of parts for internal defects is accomplished by placing a type 931 multiplier phototube in the position normally occupied by film and applying silver-activated zinc sulphide or CaWo to the tube envelope to convert X-radiation to longer wavelengths. In photube circuit, negative pulses from 931 anode are resistance-capacitance coupled to one grid of the 6SN7 tube. Amplified positive pulses are coupled to other triode section, operated as a cathode-follower impedance converter to supply a comparatively low-impedance network. Output of the cathode follower is rectified by 6H6 diode and trips a 2051 thyratron and relay to operate marker and warning light at certain value. Dc. current also operates photoelectric recorder of X-ray intensity.—ELECTRONICS

screw machines, maximum speed usually being used, with feeds 50-75% higher than for brass. Routing may be done in any type of router, but the bit should be a single- or double-flute type with well polished flutes for good chip removal. A coolant will help in preventing load-up and give protection from fire hazard.

For rough grinding, silicon-carbide or aluminum-oxide wheels (20-40 grain size, open structure range of 4-8) with vitrified or resinoid bonds can be used. Grinding wheels should be marked "For Magnesium Only." Avoid sparks. Watch out for iron inserts, core wires, and skim gates.

Dust produced in grinding and polishing is highly inflammable and is explosive if properly proportioned with air. Best removal system precipitates dust by a heavy water spray or with thin mineral oil to form a sludge with excess of liquid.

Cutting fluids are used to cool magnesium and reduce the fire hazard when thin sections are machined or high speeds used, but these have little effect on finish or tool life. Most desirable coolant is a low-viscosity, high-flash point, mineral-oil base fluid.

Magnesium-alloy sheet can be fabricated in much the same way as other metals, except that the work usually must be done at 450-650°F. because the alloys work-harden rapidly at room temperatures. The Guerin process, with a rubber pad as the female die, is widely used for forming and shallow drawing. Hydraulic presses generally are employed for deep drawing. Moderate spinning is possible at room temperature, but if much deformation is required, heat must be applied.

Magnesium alloys possess good casting characteristics, comparing favorably with aluminum. Bars, rods, tubing, and structural shapes are formed readily by extrusion. In forging, good results have been obtained by blocking in a hydraulic press and finish-forging with a drop hammer. Heat treatments to which magnesium alloys are subject include annealing, quenching, solution heat-treatment, aging, and stabilizing.

SLIPPER SLEEPER—Displayed at London's "Britain Can Make It" exhibition was this streamlined, air conditioned, electrically heated, and thermostatically controlled bed on skids. Designer claims it requires no daily making, little laundering. —ELECTRICAL MERCHANDISING

Aluminum-alloy 56S rivets are widely used in joining magnesium alloys. Arc welding in an atmosphere of helium or argon is suitable, no flux being required. Gas welding is preferred for sheet less than 0.1 in. thick which is not highly stressed, but gas welds are limited to butt or corner joints in which there is no danger of flux entrapment. Resistance welding is quite satisfactory.

The high purity of magnesium alloys today gives good surface stability. Alloys exposed to salt atmospheres for 10 years have been found in excellent condition. The greatest danger of corrosion lies in formation of galvanic couples established by contact with such metals as steel, copper, and brass or by foreign particles. —AMERICAN MACHINIST

JET-PROPELLED WASHER

Designed to be within the price range of most families (under $100), the new Kaiser dishwasher operates without a motor. Jets of hot water strike the dishes at an angle and spin the basket. When lid is opened, a hydraulic lift raises the basket above top of aluminum and enamel cabinet. Momentum maintains spin while dishes air-dry. —BUSINESS WEEK

WELDED SANDWICH SHOP—This all-welded metal sandwich shop is prefabricated on wheel-mounted, assembly-line jig by Valentine Industries. Channels are used for base frame and floor joists, angles for top frame ring. Walls, ceiling, and floor are of interlocking, 20-gage, flanged panels. Roof is of similar panels covered with ¾-in. insulating board and corrugated roofing; ceiling and walls also are insulated. Window frames are channels; door is covered with stainless steel. —WELDING ENGINEER

CAUSTIC SODA CUTS WATER-SOFTENER COSTS

Costs are reduced and operations improved by using caustic soda in place of lime in the 40,000-gph. hot-process feedwater makeup softener in a West Virginia power plant. Pump failures are fewer; solution does not require as much agitation; feed lines do not plug; lime dust is eliminated; tank charging requires less time and effort; less chemical-storage space is needed; proportioning-equipment adjustments are more dependable. Costs of treating 1,000 gal. of raw water by each method are:

	Lime treatment	Caustic-soda treatment
Chemicals	$0.0166	$0.0235
Maintenance material	0.0121	0.0037
Maintenance labor	0.1379	0.0328
Total	$0.1666	$0.0600

High maintenance costs and frequent periods of interrupted treatment with the former method are attributed to difficulty in handling milk of lime. —POWER

NEW TEXTILE FINISHES

Derived from petroleum and coal tar, two new textile finishes, Kandar, permanent stiffening agent, and Kaloc, shrink preventive for woolens, need no special equipment for application or curing. Kandar, aqueous dispersion of a thermoplastic resin, increases strength of material 5-10%, costs ½¢ per yard for application. Kaloc reduces shrinkage to 2-3%, increases fabric strength 10%, gives 50% greater abrasion resistance. Not affected by laundering or dry cleaning, agents are applied to cloth by dipping, squeezing between rolls, and quick drying. U. S. Rubber Co. developed them.—BUSINESS WEEK

ANOTHER ATOM POWER PLANT

To be built around a uranium pile, a $20,000,000 nuclear physics research laboratory at Schenectady, N. Y., will be operated for the government by General Electric. The fourth in a projected U. S. chain of such laboratories, it will investigate all phases of atomic power development. The pile is the second atomic power unit to be planned. The other will be at Oak Ridge. —ELECTRICAL WORLD

FACTS ABOUT TIRE WEAR

Studies of tire wear, conducted by Iowa State Engineering Experiment Station, proved that even with proper attention to tire maintenance, the life expectancy of pneumatic rubber tires is reduced from 56,000 at 35 mph. to 18,700 miles at 65 mph., on concrete or bituminous surfaces. Average life on concrete pavement is 36,650 miles, on gravel, 23,160. Driving speeds, roadway surfaces, and maintenance habits of driver most directly influence tire life.

Speeding on curves until tires "scream" increases wear ten times; stop-and-go driving on pavement is three times as damaging to pneumatic tires as is country driving. —BUS TRANSPORTATION

CUSTOMER-IS-BOSS POSTERS IMPROVE WORKER ATTITUDE

To stimulate its 8,500 employees to more efficient and careful work, Delco Products displayed a series of 13 plant posters in 13 weeks which appealed to self-interest and fair play. These posters caused the employees to look at their work through the customers' eyes. They asked such questions as: When you're a customer: (1) "Do you want to have the cost hiked by wasted time?" (2) "To pay for less than full value?" (3) "To have your plans upset by delays?" (4) "To pay for careless work?"

These finger-pointing posters followed a house-organ editorial and three posters which emphasized the fact that the "customer is boss," that he is free to choose between competitive products, and that the worker's job depends upon pleasing customers.

Employee interest in the posters was keen, their reaction favorable. While effect on production cannot be proved, Delco estimates that an extra minute's production per worker per day amounts to 3,500 man-hours a month. —FACTORY

H-F MAY BE BACTERICIDAL

Research at the University of Southern California may indicate that the high-frequency field of electronic heaters may have an effect on micro-organisms beyond the purely thermal one and that the mechanism of cell destruction under such conditions where the walls are punctured has been observed. That there is a specific frequency for each organism or group seems probable. —ELECTRONICS

TO BURN COAL IN GROUND

Coal difficult or impossible to mine will be burned underground by Alabama Power Co., in cooperation with U. S. Bureau of Mines, to test feasibility of generating producer gas for power purposes. Seam, 30-40 in. thick and 40 ft. wide, will be cut off from main seam by a 20-ft. wide trench. Horizontal shafts 6 ft. in dia. will [illegible] from cut-off trench, connected at down-slope end. Air, blown in one end of horizontal shaft, will pass fired face and force out producer gas at the other end of the shaft. —BUSINESS WEEK

DRUG SPEEDS HEALING

Japanese clinical records indicate that a new drug, called Koha, is remarkably effective in speeding the healing of severe burns, lesions, ulcers, frostbite, tubercular-leprosy, and other diseases. A derivative of neocyanine, the drug must be administered intravenously. It is said to increase the number of white corpuscles, stimulate regeneration of tissue, and increase the survival of damaged tissue cells. —CHEMICAL ENGRG.

CALLING SERVICE CARS

From an experimental 250-watt, 39.86-mc. FM radio station in its office building, Pacific Gas & Electric Co. selectively telephones any one of four service cars equipped with 35-watt transmitter-receivers. When a number is dialed, a signal light on the car instrument board flashes if the car is moving, horn blows if car is parked. —ELECTRICAL WORLD

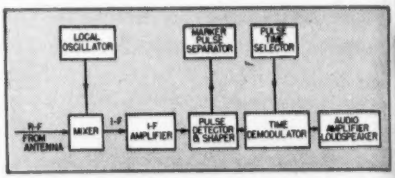
KITCHEN PROGRESS—New features in postwar gas ranges will include nosmoke broilers, shelves on oven doors, hotter flame jets and heating elements, 7-qt. deep-well cooker, safety locks on gas controls, heat regulators, fuel-flow controls, and top-of-range broilers (one type is shown above). —SCIENCE ILLUSTRATED

DATA ON PULSE-TIME RADIO

Circuit data on the new pulse-time modulation have been released by Federal Telecommunication Labs. Eight sequences of 0.5-microsec. pulses from a common 24-kc. sawtooth generator are time-modulated by 8 signals (50-9,000 cps.) from several studios, marker pulses being interleaved. These signals are fed to an r-f modulator for further amplification and keying of a 930-mc. oscillator. The 800-1,000-watt peak and 40-50 watt average output of the transmitter is fed to a vertically stacked loop antenna having a 9-decible gain over a dipole throughout 360 deg. in a horizontal plane.

The directive receiving antenna consists of a double dipole at the focal point of a parabolic reflector. The receiver is fixed tuned. Proper selection of the pulses is made by simple timing circuits so that several channels can be transmitted on a single carrier. The pulse detector is of the conventional amplitude type and includes clipping and shaping of the pulses for further signal-to-noise improvement. The pulses are passed on to the audio detector which performs the two functions of time selection of the desired pulse channel and its demodulation to give the audio program output.

To provide a time reference for separating the various programs at the receiver, one pulse sequence is fed to the marker pulse shaper which produces a double pulse. —ELECTRONICS



Basic elements of pulse-time-modulation receiver. Pulses are separated and sorted to provide eight 9,000-cycle audio channels and/or audio, facsimile, and telegraph services.

PNEUMATIC PICKER—Replacing electrical pickers for picking top and bottom rolls, roll necks, roll stands, cap bars, and roll-weight saddles, this thumb-controlled pneumatic picker weighs 17 oz., has 6-in. blade, revolves at 12,000 rpm. Air hose is held by hooks attached to creel rods. —TEXTILE WORLD

SAFER, MORE RELIABLE MINE POWER

Complete sectionalization of the dc. distribution system and installation of load-limiting equipment at a coal mine in Utah resulted in greater safety and better service. Ten tie and 17 stub-end sectionalizing units are used in the 1,650-kw. system. Previously, all units could feed into a short to the limit of their capacity, but now the tie breakers open to isolate the substation affected. Automatic reclosing circuit breakers with load-measuring relays govern reclosing after tripping. Since substations frequently must handle more than normal overload rating, load-limiting equipment, including rectifier, permits operation at reduced voltage. A time-delay relay disregards momentary peaks. —COAL AGE

New Construction Techniques

Movable platform protects buildings from street-level blastings; highway cuts seeded by machine; novel gantry scaffolding used in cathedral repair

To protect buildings housing delicate machinery from damage in street-level blasting, Dravo Corp. designed a rolling timber platform 24 ft. sq., mounted on 21½-ft. gage tracks, to be rolled over the 17½-ft. hole during blasting. Frame of platform is of 8x8-in. timber, covered with 2-in. oak planking. A 7x7-ft. hole in center of platform relieves blast concussion. Hung by cables below platform is a 16x16-ft. blasting mat, lowered into hole at time of blast. Rolled into position by derrick, platform keeps all but dust inside hole.

For seeding steep highway cuts and fills, U. S. Army has designed a blower rig from a standard 25-hp. gasoline-powered forage blower and a steel operator's platform. A screw conveyor forces the soil, seed, and fertilizer mixture into a fan, which expels it through a flexible nozzle operated from raised platform. Slopes as high as 50 ft. above highway level may be reached by machine operating on road. About 16 cu. yd. of mixture will cover one acre ½ in. deep.

For repair work on a New York cathedral, George A. Fuller Co. erected a gantry frame of 2- and 2½-in. scaffolding pipe, in 6-ft.-square panels, to support a 2-ton electric overhead crane. Crane operates 83 ft. above sidewalk through a 15½ ft. opening between bents. Cable guys, ⅝-in., give stability to bents and hold craneway against building. To prevent crane from jumping bumpers at street end of trolly, power is cut off 16 ft. from end and deadman switch must be closed to travel beyond this point. Hoist and crane are powered from street level.

McNally-Davis, contractors, laced telephone poles to bottom chord of light steel trusses to give additional stability during hoisting operations. Trusses were [illegible] alley . . . For faster laying of a small railroad spur track, steel ties were used in place of conventional wood ties. Plates were welded to rails and to ties . . . Using pneumatic hammers, four men, working on opposite sides of rail, can drive railroad spikes into hardwood ties as fast as they can walk . . . Dutch engineers are sinking concrete caissons, used in Normandy, to plug dike breaches on Walcheren Island. —CONSTRUCTION METHODS

In improving old gravel roads, Missouri State Highway Dept. is sealing a 30-ft. rolled stone face with a 22-ft. asphalt top. Saturated crushed rock is spread and compacted with rubber-tired and steel rollers. Pea gravel seal is built to a 6-in. depth over a 20-ft. center width, feathered to zero thickness at edge. To reduce compacting effort, about 1½ lb. of calcium chloride per sq. yd. of course gravel is applied before adding water. Such construction costs about three times as much as pervious clay-gravel roads, half as much as concrete. Standards for earth compaction have been lowered from 95 to 90%. —ENGRG. NEWS-RECORD

MINE RADIO PAYS

Installation of a frequency-modulated two-way radio-telephone service in the Pando Coal Co. mine has saved $40-50 per day by cutting off one gathering locomotive and reducing overtime pay. Six units have been installed—five on locomotives and one in scale house at drift portal. Unit consists of transmitter, receiver, loudspeaker, and microphone. It costs less than $600 per installation. The unit weighs about 60 lb. It is moisture and dust proof.

With high-frequency waves carried over trolley or feeder lines and returned via rails, good communication is claimed [illegible]

NEW PRODUCTS

Multiple Milling Machine—Permitting single or double milling of 4 pieces at once, the new Sommer & Adams Co. "No. 3 Craftsman" is a drum-type machine. For straddle milling, sloting, or facing, it increases production speed on nuts, bolts, pins, and strips. Features are: quick-loading chucks, automatic ejection of finished piece, easy access to cutters for maintenance. —BUSINESS WEEK

High-temperature Masking—For application to armature shafts and coil connecting points before varnishing, lacquering, or wax impregnation, a new thermoplastic stripping compound, Armatex No. 307, has been developed by Riley & Geehr, Inc. With dipping range between 200-225° F., it sets instantly with an average buildup of 0.075 in., and will not remelt at temperatures up to 325° F. It peels after baking. —ELECTRICAL WORLD

Safe Grinding Wheel—Rubber compound vulcanized to 20-gage steel washers on sides of grinding wheel prevent broken pieces from leaving shaft. Centrifugal force transfers stress to washer and shaft; pressure forces rubber into porous surface of wheel. It is made by Industrial Products Co. —FACTORY

Improves Tester Results—For use in abrasion-resistance testers, Taber Instrument Corp. offers a 2-stage turbine vacuum unit which, by rapidly and thoroughly removing lint and abrasive from tested samples, assures continuous uniform contact of abrading wheels against sample. —TEXTILE WORLD

Double-vise Workholder—Two parts are held together for welding by cast-aluminum brackets with two clamping faces that may be positioned at any angle. McFerron-Myers Products Co. also makes a 3-way holder for T-joints. —WELDING ENGINEER

Electronic Plastic—Developed by General Electric Co., a new plastic, Textolite 1422, possesses a low power factor and machines readily, is suitable for coil forms and insulators used at high frequencies. —ELECTRONICS

Convenient Drilling Machine—With a single lever controlling positioning, clamping, and drill feeding, the new Detroit Tap & Tool Co. drilling machine will handle round, square, and other stock ⅛-2⅜-in. outside dia., length variable to convenience. Spindle-drive motor, with V-step pulley, has 3 speeds: 1,250, 2,400 and 5,000 rpm. —

FLIPSWITCH CONVEYOR—Flow of cartons or cases can be directed to either branch of this Y-conveyor unit by turning over the pivoted center section. The "Y" can be connected to other conveyor sections without use of tools as ends are equipped with male studs. It is made by Speedway Conveyors, Inc. —FOOD INDUSTRIES

Dual Electronic Heater—Suitable for both induction and dielectric heating, the Ther-Monic M-285C generator introduced by Induction Heating Corp. is rated at 285 Btu. per min. It operates on 375 kc. for induction heating, 20 mc. for dielectric. —ELECTRONICS

Electrical Fluid Drive—New Electrofluid motor, introduced by Link-Belt Co. in sizes up to 20 hp., will permit the user to buy motors according to operating hp. rather than starting hp. Motor of drive starts at no load, regardless of inertia of load. Torque develops in ratio of square of speed as motor accelerates. —BUSINESS WEEK

Crash-resistant Fuel Tank—Of compounded synthetic rubber, plastic, and nylon construction, the new U. S. Rubber Co's. crash-resistant aircraft gas tank is much lighter and twice as strong as standard tanks. Shipped ready for installation, tank will withstand — 40° F. to 200° F. —AVIATION NEWS

Ball Vise—Universal ball vise, made by Reype Corp. permits quick change in work position by lever lock and release and holds work at desired angle. Jaws are reversible and interchangeable; copper, brass, or serrated jaws

Frequency-actuated Relay—Contacts on a vibrating-reed mechanism, responsive to preset frequency, pass pulsating current from power supply to controlled circuit in the new resonant relay of Stevens-Arnold Co. The grid of a thyratron is triggered directly by the pulses, no auxiliary relay being needed. —ELECTRICAL WORLD

Versatile Loom—Capable of weaving light or heavy cotton, wool, rayon, silk, or linen fabrics, a new loom, developed by Adolph Sauer, Switzerland, has no superstructure; harness is supported and operated from below. All hand-operated controls are on one side, loom mechanism is housed to decrease cleaning. No handwheel is needed to position lay. —TEXTILE WORLD

Advanced Adhesive—E. I. du Pont de Nemours is producing a thermoplastic synthetic elastic recommended for bonding synthetic rubbers and vinyl films or sheets of steel, aluminum, glass, wood, or concrete. Cold-setting, it dries in 3–10 min. to a tacky surface, requires 2 hours for complete drying. It is resistant to oxidation; aromatic hydrocarbons will destroy bond, oils and gasoline weaken it slightly. —BUSINESS WEEK

Handy Insulation Tester—To check insulation resistance in ac. or dc. equipment, Ideal Industries, Inc., has designed a self-contained tester requiring no batteries, external power supply, brushes, or commutators. Small hand crank generates power; tests range from 0-100 megohms. —BUS TRANSPORTATION

Meat Pies Frozen—Packed in re-usable, glass casserole with lid, a quick frozen chicken pie has been added to Frozen Wonder Food Corp. line. Chicken and vegetables are precooked in thick gravy and placed in crust, then frozen. —FOOD INDUSTRIES

Tungsten Carbide Balls—Precision balls of tungsten carbide have been introduced by Industrial Tectonics. Hardness and corrosion resistance make them useful in check valves, special bearings, and antifriction mounting. —POWER

Figures Angles Automatically—Able to compute angles from bearings, without figuring interior and exterior angles independently, Cardinell Products' transparent Plotractor saves time for engineers, surveyors, and navigators. Interior rotor revolves full 360 deg. and has same calibrations as surveyors' scale. —CONSTRUCTION METHODS

Toy Radio Receiver—Laco Products, Inc., is manufacturing parts for a miniature receiver built around a small pentode tube and operating on single cell for filament supply and 22½–90 volts "B" supply. Circuit is a modified grid-leak detector and amplifier. Kit includes construction diagrams and radio

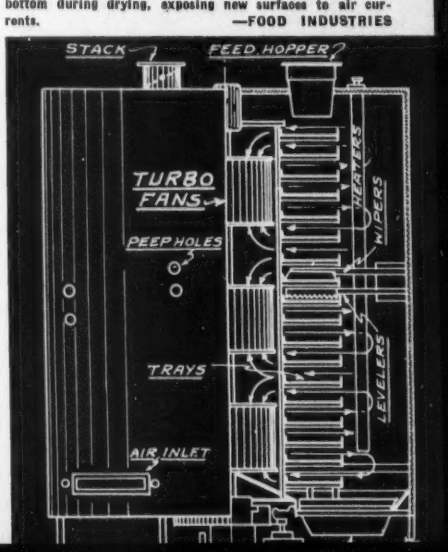
Paint for Rusty Metal—Applied directly to rusty surfaces, a new type of industrial paint called Rustrem is reported to prevent further oxidation of the metal. Developed by Speco, Inc., it may be used on metals submerged in water or exposed to moist or fume-laden atmospheres. —ELECTRICAL WORLD

Lighted Clipboard—Tennan Lights, Inc., has developed an illuminated clipboard, 7x12 in. or 9x14 in. Light, powered by flashlight batteries, is housed in strong metal spring clip; board is masonite. —FACTORY

Magnesium Ladder—White Aircraft Corp. is manufacturing an all-welded, magnesium ladder having high wearability and strength. An 8-ft. length weighs 5½ lb.; 24-ft. extension ladder, 31 lb. —ENGRG. NEWS-RECORD

Another Useful Silicone—Designed for heat stability, low water absorption, and good insulating characteristics, Dow-Corning Corp.'s new DC2103 resin is a 60% solution of silicone resin in toluene. Solution can be used as a bonding agent for inorganic fabrics, powdered metals, mica, silica, or carbon. —BUSINESS WEEK

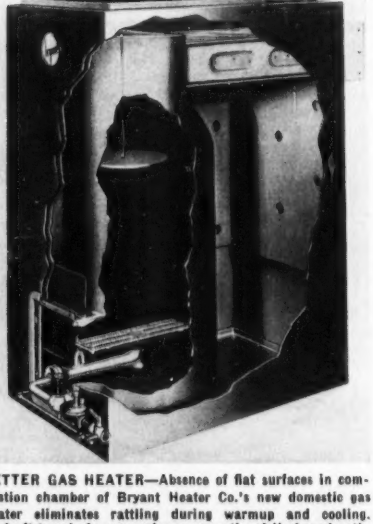
TURBO DRIER—Suitable for fine powders, granular materials, pastes, or slurries, this Wyssmont Co. turbo continuous drier consists of circular shelves with air space between trays, permitting parallel or counterflow air circulation. Material is wiped from tray to tray from top to bottom during drying, exposing new surfaces to air currents. —FOOD INDUSTRIES



NEW PRODUCTS

Handy Power Excavator—Used for digging, excavating, grading, loading, materials handling, stock-piling, and dumping, Trackson Co.'s new Traxcavator Model 1T4 has 1-cu. yd. bucket with digging range of 14 in. below tracks and 56 in. above. Operated from front power take-off from tractor, bucket can be dumped at any point on lift. —FACTORY

All-purpose Wrench—Made of steel and cadmium alloy and having 1-ton gripping pressure, the new A.C.E., Inc., lock wrench can be used as a combination straight, end, or pipe wrench, vise, toggle press, clamp, or pliers. Maximum jaw opening is 1¼ in., overall length is 10 in. Set screw holds jaws closed on object. —FACTORY



BETTER GAS HEATER—Absence of flat surfaces in combustion chamber of Bryant Heater Co.'s new domestic gas heater eliminates rattling during warmup and cooling. Updraft travel of gases replaces conventional U-shaped path, so corrosive condensation is less likely to be trapped in heat-transfer tubes. Removable cover at junction of transfer tubes and draft diverter allows easy cleaning. Rectangular burner head simplifies combustion-chamber front opening, is said to avoid hot spots in chamber. Tubes are welded stampings. Furnace sizes are 70, 90, 120, and 140 thousand Btu. per hr. Two smaller ones will pass through ordinary

Circle Flame-cutter—Developed by Scientific Research Co. to flame-cut accurate circles in metal, the Flash Circle burner has a ball-bearing rotary head which allows free operation of torch clockwise or counterclockwise. Head is mounted on an adjustable arm which has a centering pin on one end and a roller on other. —WELDING ENGINEER

Copper Paint—Containing metallic copper, a new marine paint, manufactured by American Pipe & Construction Co., has 4 times the service life of current paints for ship hulls. Used on either metal or wood, paint effectively repels marine life. —BUSINESS WEEK

Plastic "Cloth"—The U. S. Rubber Co. is producing a pliable, tough, and washable plastic sheeting (U. S. Royalene) without fabric backing or surface finishing coats. Easily tailored, it is not affected by alcohol, oil, grease, mildew, or most acids. It is available in a range of colors and in several gages and pliabilities. —CHEMICAL ENGR

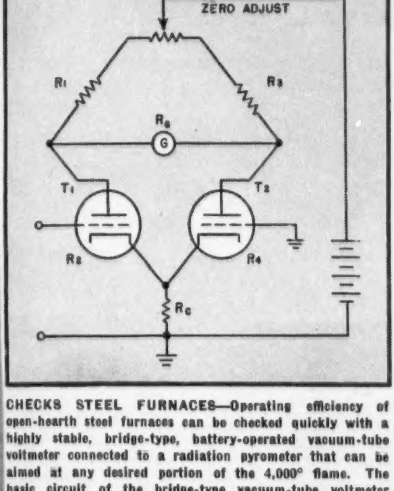
Corrugated Aluminum Bag—Of corrugated aluminum foil with double crimped joints, "walpouch" food containers, made by A.B.C. Packaging Machine Corp., will hold 3 oz. of powdered material, 4 oz. of liquid, or 6 oz. of semi-liquid. Hermetically sealed and moisture-vapor-proof, the packages cost about $0.008 each and can be fabricated in the plant. —FOOD INDUSTRIES

Dispenses Solder—Incorporating a positive ratchet feed and thumb control, a new Sound Equipment Corp. solder dispenser may be attached to any conventional soldering iron. Solder-feeding tube is adjustable to place solder at required point regardless of tip length. —MILL SUPPLIES

Electronic Parts Counter—To count freshly painted steel parts in its plant, Wiremold Co. has developed an electronic device with an inductance bridge in which the balance is upset each time a part passes through a 10-in.-dia. coil when being dipped. The "signal voltage" is fed through a transformer to a 2-stage amplifier to increase plate current of the second stage and energize a relay to operate a counter. —ELECTRICAL WORLD

Safety Die Jack—Persson Mfg. Co.'s new die jack enables operator to elevate or lower die set to desired height without danger of injury to self, die, or punch. Clamp block, of one piece, heat-treated aluminum alloy, fits into tool box. —FACTORY

Foam to Fight Fires—Used by the Navy during the war, a foam-producing material for smothering severe fires has been placed on the market by National Foam System, Inc. About 800 gal. of foam can be made quickly by mixing fresh or salt water with air and the contents of a 5-gal. can of the special liquid, this being done in a nozzle that can



CHECKS STEEL FURNACES—Operating efficiency of open-hearth steel furnaces can be checked quickly with a highly stable, bridge-type, battery-operated vacuum-tube voltmeter connected to a radiation pyrometer that can be aimed at any desired portion of the 4,000° flame. The basic circuit of the bridge-type vacuum-tube voltmeter developed for this purpose is shown. —ELECTRONICS

Inked-ribbon Reviver—Ribbons on office machines are re-inked in use by a device developed by O. W. Marks. A special ink is applied to the ribbon guide rollers by a wick in a reservoir mounted on each side of the machine. One company reduced average monthly ribbon consumption from 95 to less than 9. —BUSINESS WEEK

Air-mechanical Separator—Made by Bauer Bros. Co., a new separator combines mechanical forces and air currents for close classification of materials. Buoyant effect of air currents forces lighter materials to outside edge of perforated deck. Heavier materials, traveling counter to air currents, are discharged at center by mechanical impulses from an eccentric weight, power being supplied by a small motor. —FOOD INDUSTRIES

Lift Truck With Arms—Light, bulky cartons are picked up by spring-closed, hydraulically opened, clamping arms on the new lift truck of Automatic Transportation Co. No pallet is needed. —AMERICAN MACHINIST

Miniature Bearings—Shaft diameters of 0.032 to 0.094 in. can be accommodated and radial or thrust loads taken by ball bearings introduced by Miniature Precision Bearings. Since the chrome alloy steel balls are self-retained, no separator is required. The bearing sizes are 1/32 to 3/32 in.; race OD, 0.1250 to 0.375 in. —PRODUCT ENGRG.

Glass Fishing Rod—Laid parallel over a tapered wood core and bonded with synthetic resin, glass fibers make the new Shakespeare Co. flyrod light, strong, flexible, and waterproof. It does not take a set after long use, can be built for exact action and weight wanted. —PRODUCT ENGRG.

Incinerator for Home—Able to handle up to 60 lb. of garbage or refuse, the Calcinerator, produced by Valley Welding & Boiler Co., is an automatic, gas-fired incinerator for home use. Objectionable gases are not released. Of formed and welded steel, unit is insulated and does not radiate heat. —BUSINESS WEEK

Flexible Pipe Joint—Unequal thermal expansion and contraction on either side of anchor points is permitted in pipe lines by the bellows-type anchor joint developed by Cook Electric Co. —FACTORY

Fuses Replace Breakers—High-current Z-type copper fuses have been used instead of circuit breakers to protect power station feeders with 15% first-cost saving and low maintenance. Developed by Consolidated Edison Co. of New York, the fuses provide selectivity with the automatic breakers and commercial type fuses located at individual loads served by the feeders. —ELECTRICAL WORLD

Aluminum Homes—All-aluminum, prefabricated, 19x19½-ft., 2-room houses, weighing 970 lb. ready for export, are made by Southern States Iron Roofing Co. with sides of 0.019-gage sheets and alloy wall angles. Interlocking aluminum shingles, of 0.019-gage Alcoa roofing sheets, plain or factory-painted, are good heat reflectors and require little or no maintenance. —CONSTRUCTION METHODS

Machine Sells Coffee—Melikian & Rudd has perfected a coin-operated electrical coffee-vending machine. Coffee costs a nickel; cream and sugar are added by push-button controls. The beverage is discharged into paper cups. —BUSINESS WEEK

Chemical "Mop"—Capable of absorbing oil, grease, and water to the extent of 120-140% of its own weight (30 lb. per cu. ft.) a granular material produced from alumina silicate keeps floors clean to avoid slipping and flash fires. Blue Mountain Clay Co. introduced the product. —AVIATION

FREE SERVICE TO READERS

As a special service to our readers, the McGraw-Hill Digest will furnish, without charge, additional information about any new product or technical development described in the publication. Inquiries are welcomed. Address your letter to: The Editor, the McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y. U. S. A. —THE EDITORS

Flame-Cuts Finished Parts

Many metal parts cut to such close tolerances that subsequent machining is unnecessary. Production is fast, cost low

By using the cutting torch for jobs which others thought could be done only in a machine shop, Western Steel Cutting Works has developed into a major industrial enterprise. Relatively close tolerances are obtained in fast production work. Costs often are much lower than by any other method.

Parts flame-cut to final form, with no machining (except simple drill holes in some cases) include:

Crosshead used as tank-towing fixture, line blind to change size of opening in pipes, brackets for earth-moving equipment and pumps, lever guide for tractor ratchet handle, hydraulic hoist plate, part of mold block to form interlocking concrete blocks used without mortar, boss used on amphibious tank (cost 2¢ compared to 3.2¢ when milled), part for tire-changing jack, spanner wrench, strainer plate, rod clamps, brake cam for army trucks, S-wrench, bicycle sprocket, ratchet and handle, end wrench, wire-rope socket, chrome-molybdenum steel linkage used to lift B-29 bombers, special wrench, lever for tire-changer, and spline nut.

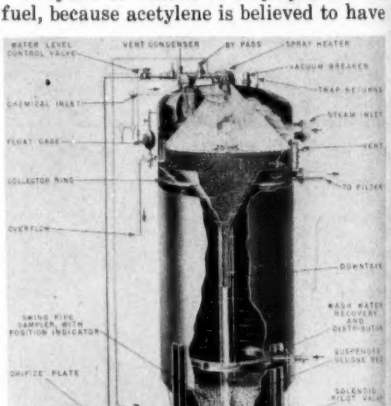
Thicknesses cut in these items range from $\frac{3}{16}$ to 4 in., and tolerances for all but two are $\pm\frac{1}{64}$ in. Most of the parts are of mild steel, but many high- and low-carbon steel alloys are cut with equal ease; the higher carbon steels usually have a finer finish when cut than mild steel.

As a postwar operation, plowshares are flame-cut from $\frac{3}{8}$-in. steel plate originally for army tanks. These are stock cut, 10 at a time, in 8 min. for a 54-in. contour. The torch, templet, and driving mechanism are suspended from a large adjustable framework projecting from a heavy vertical tubular post. In its "precision" travel, the torch is guided by a small spindle or contact roller which is magnetized so as to follow closely the steel templet contour. Speed is rheostat controlled.

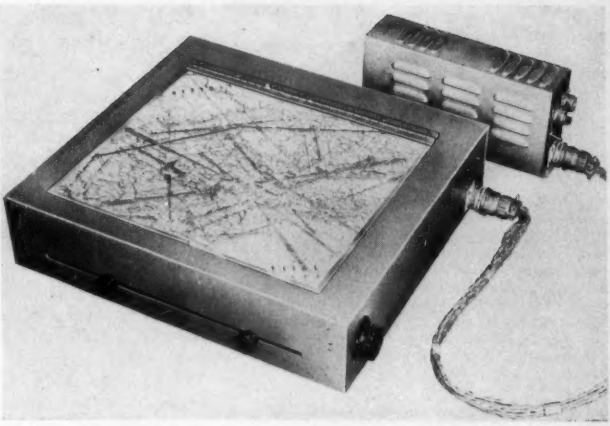
Cutting speeds and kerf (cut) widths for different thickness of mild steel:

Thickness (in.)	Speed (in. per min.)	Width of kerf (in.)
¼	20–28	0.050–0.075
½	17–24	0.065–0.095
¾	15–22	0.075–0.110
1	14–19	0.075–0.110
1½	12–15	0.085–0.130
2	10–14	0.105–0.130
3	8–11	0.120–0.165
4	6.5–9	0.135–0.165
6	4.5–6.5	0.135–0.190
12	2.5–3.5	0.260

Propane or butane is employed as the fuel, because acetylene is believed to have



NEW WATER SOFTENER—Suspended sludge forms a bed which acts as a filter screen for fine particles in the new type, 2-stage, hot-process, boiler-feedwater softener developed by Permutit Co. Sludge also saves lime by retaining it until it reacts with water hardness, and it increases silica removal through intimacy of contact of oxide or hydroxide with magnesium. Photoelectrically controlled



AUTOMATIC NAVIGATOR—Still in development stage by Bendix Aviation, this automatic plotter indicates plane's position by dot of light on standard flight map. Before take-off, two automatic direction finders are adjusted to conform with flight course; thereafter, position is always indicated. —AVIATION NEWS

more hardening (carburizing) effect on hot metal, a handicap if subsequent machining should be required.

Sales engineers determine whether a customer's product lends itself to flame-cutting. —WELDING ENGINEERING

RADIO ECHO RANGING

Motion and speed of an underwater target are determined by means of the Doppler effect in echo-ranging equipment. For example, if the distance between the Sonar-equipped vessel and the target is increasing, the frequency of the echo will be lower than that of outgoing pulse, giving a measure of relative motion of ship and target. Absolute motion is determined by reference to "fixed" surface waves. —ELECTRONICS

MODERN GARAGE

Servicing a fleet of 40 buses, a new garage in New Jersey features air-conditioned offices, all-fluorescent lighting, 15,180 sq. ft. of post-free parking space, a photoelectrically controlled washing process that takes 14 sec. A monorail 250 ft. long, carrying a 1-ton electric crane, skirts the 70x50-ft. maintenance section and passes through the rebuilding shop to a 25½-cu. ft. degreasing tank and

GUAVA POWDER USEFUL IN FOOD PROCESSING

Guava juice powder, with the flavor and 60% of the high vitamin content of the original fruit, is produced by Hawaii Agricultural Experiment Station. This pectin product keeps well, can be shipped long distances, is converted to guava jelly by dissolving in water, adding sugar (50-60% final concentration) and boiling. It is an excellent source of pectin for other jams and jellies, is a flavoring agent for fruit nectars, ice cream, and confections, and will enrich other foods, especially fruit juices, in vitamin C.

To produce the guava powder, the whole fruit is pulped, boiled 20-30 min. with equal volume of water, and filtered, the hot filtrate being used as the extracting agent for subsequent batches until it becomes too viscous to filter. By a continuous extraction system, the pectin content can be raised to 1.2% and total solids to 8.5%. Evaporation under reduced pressure produce a sirupy liquid with 20% solids, sucrose is added at 2:1 ratio, the product vacuum dried without heat.

The resulting crystalline-like substance is ground and packaged in moisture-

MADE IN 26 MINUTES—Designed for efficient production, hydraulic units of Republic's "Seabee" airplane, in some cases cost only 25% as much as if made by conventional practices, are easily serviced and maintained. Standard parts and stock sizes are used where possible. Parts are designed for machining without costly jigs and fixtures if feasible. Reduction in number of bolts cuts assembly time. Master brake cylinder above (assembled, left; components, right) has drop-forged cylinder reservoir requiring only simple machining. Other parts involve only simple turning or stamping. Unit is completed in 21 operations. Time, 26 min. —AVIATION

BEES MAKE MEDICINE

Russians have produced quinine honey at experimental stations in the North Caucasus by feeding bees a diet of quinine and honey. The honey is reported to have exceptional medicinal qualities. Vitaminized and other medicinal honeys have been developed and are claimed to have beneficial effects. —BUSINESS WEEK

FOR SAFER MINE HOISTS

Most mine-hoist accidents are caused by internal corrosion and wear of rope, according to a Canadian nonindustry investigating committee. Failure of safety dogs to stop descent comes second. Daily visual inspection of ropes and use of magnetic coils to detect deterioration is recommended, together with:

1. Drum and head sheaves of diameters not less than 80 to 100 times rope diameter.
2. Systematic research on desirable properties for rope wire.
3. Investigation of corrosion prevention in ropes, including a study of rope dressings.
4. Research into electromagnetic methods of hoisting-rope examination.
5. Investigation of possibility of incorporating electrical conductors in hoisting ropes for purposes of cage-to-surface communication and automatic braking.
6. Development of improved safety devices.

Decrease of hoisting speed will not de-

BAND WIDTH CONTROL SUPPRESSES RECORD NOISE

High- and low-frequency phonograph record noise can be suppressed without noticeable injury to the realism of reproduction by controlling audio amplifier bandwidth automatically and continuously. The band is extended during loud passages, contracted for the low-level portion. Thus the noise is reduced when it would be most noticeable, and full bandwidth is used when it is most necessary—at high levels. A relatively simple system will give more than 20 db. attenuation to high- and low-frequency noise, with substantially no attenuation within the pass band. The remaining narrow noise band is so situated in shellac records as to coincide with the point of minimum noise energy. It also lies within the musical spectrum, so that it is masked easily, even by low-level music.

Heart of the noise-suppression system is a controlled bandpass filter known as the gate circuit, which has extremely sharp cutoff. —ELECTRONICS

LIGHTING WITH PAINT

Light intensity at work level has been increased 25% (from 20 to 25 footcandles), with greatly improved quality of distribution, by painting walls, ceilings, and structural members with white in the 4.75-acre windowless factory of Simonds Saw & Steel Co. Originally the ceiling was painted ivory; walls, an off-white; upper structure, columns, and overhead walkway, green. The fluorescent lighting system includes 1,500 Cooper-Hewitt 100-watt mercury vapor tubes in reflectors 13 ft. above floor and spaced 10x12 ft. —ELECTRICAL WORLD

POWER-LINE AIR PATROL

Both emergency and routine power-line inspections are done for the Montana Power Co. by light planes flying 60-85 mph. from 50 to 100 ft. above the line and 50 ft. to one side. Thoroughly trained pilots guide the planes, which carry one

Revolution in Farming

Increased mechanization, better seeds and fertilizer, added efficiency have stepped up food production and improved farmers' financial status

American farmers have passed midstream in the "farm revolution" of 1935-50. Today, the farmer is operating on a businessman's basis; farms are fewer and larger, tenantry and mortgage debt are declining, capital investment is expanding. The number of farms declined 13% between 1935-45, yet average size of farms increased 26%; number of tenants was down 34%; mortgage debts were off 31%. About $90 billion has been spent on land improvement, purchases, and debt reduction, while $15 billion has been saved as cash surpluses.

The ratio of liquid savings, plus durable equipment, to real estate value has risen from one-third to one-half during the war.

Average farm incomes have outgained the average urban income between 1935-39 in two ways: farm cash income almost tripled as production rose one-third and prices doubled, and farm population was reduced one-fifth while the nation's population grew. This gave the farmer an income increase three-fourths faster than his urban neighbor. This favorable financial situation allowed the farmer to buy land, pay off his debts and enlarge holdings, while the marginal farmer deserted the farm for the city.

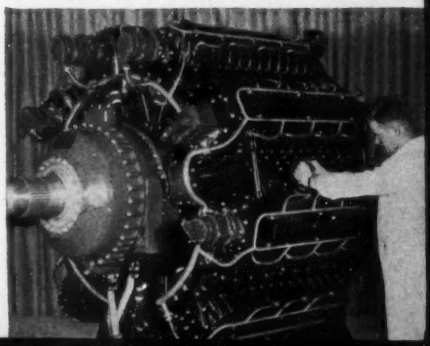
During the war, farm output was up one-third with a 10% drop in farm labor. Per worker output was raised about 50%.

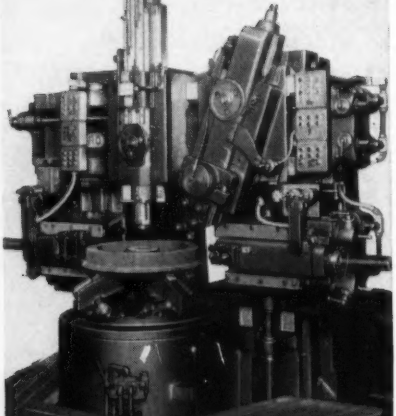
Over half of the increase in output was directly due to technological advancement. More efficient fertilizers and better seed brought larger yields per acre. Improved breeding and care of animals increased dairy product and meat output.

By 1950, the production revolution of farms will enable the unprecedented highs reached during wartime to be equaled, or slightly surpassed, even though weather, acreage, and man-hours of work go back to prewar levels. Baby tractors will serve the small farmer. Pickup balers, hay driers, milking machines, and other machinery will be used increasingly. Fertilizers can make the same increase possible that they have made during the past few years. Newly found insecticides and weed killers will boost production. Artificial insemination, better bred strains of cattle and disease-prevention techniques promise greater meat and dairy products supply.

Mechanization of farm work, just starting, will yield gains perhaps comparable to those derived from the mechanization of field operations, now on the road to completion. Rural electri-

LARGEST AIRPLANE ENGINE—Developing 5,000 hp. from 9 banks of 4 cylinders each, Lycoming's new XR-7755 liquid-cooled power plant is the world's largest reciprocating airplane engine. Coolant pump circulates 750 gal. per min., propeller drives through a 2-speed, dual rotation reduction gear. —AVIATION





TIMESAVER—Wheel-boring and turning operations are reduced considerably with Cincinnati Planer Co.'s new electronically controlled Hypro machine. Three hydraulic chuck jaws hold wheel and leave hole free for boring and rim, flange, and tread free for turning. The machine has a boring and facing head, a rim-turning head, and two side heads which automatically traverse into contact with the wheel, change to feed rate for turning and boring, then return to starting position. Carbide tools are used for turning. The 100-hp. drive motor provides table speed of 5-25 rpm. —AMERICAN MACHINIST

fication had reached about 10% of farms in 1935; by 1950, the figure may reach 90%. One-quarter of our farms now have running water and toilet facilities; one-third have telephone service. A million new tractors will be added to farms. Worn tractors may add another half million to this figure by 1950. Two million trucks are needed. —BUSINESS WEEK

FAMILY-SIZE TURKEYS

U. S. Department of Agriculture has begun distribution of eggs, poults, and breeding stock of small-type turkeys to state universities and corporations for future distribution to breeders. New turkey has thick-set, compact body, shorter legs and neck, increased meat on breast and legs. Lighter than normal turkey, the toms weigh 10-15 lb., the hens 7-10 lb. SCIENCE ILLUSTRATED

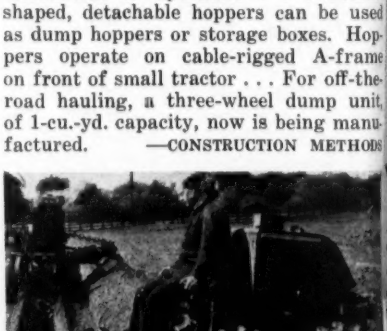
GANG PROCESS CHARTS

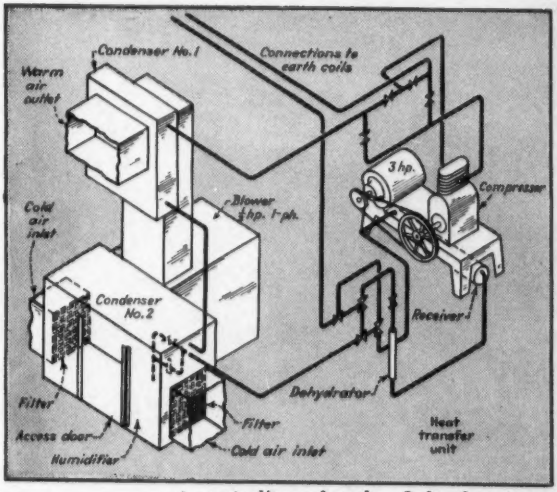
Gang process-charts for 2- to 20-man crews are used by Armstrong Cork Co. Such charts plot operations horizontally, by vertical worker columns, using conventional symbols. Giving overall perspective of work cycle of each man in relation to crew as a whole, these charts aid in balancing work.

Needing no accurate time values, the charts allow relatively long work cycles involving many small operations to be handled in easy, simple fashion. Advantages: problems of large crews can be solved quickly; unnoticed facts about process are revealed; chart provides simple, easy-to-understand explanation of cause and effect of problems. —FACTORY

NEW CONSTRUCTION AIDS

British postwar models of construction and earthmoving equipment will incorporate many war-proved modifications. A small bulldozer will permit driver to ride blade frame and observe work . . . Double steering column—facing front and rear—on 9-cu.-yd. end dump truck gives driver two-way vision; unit has pivoted seat. Truck is diesel powered; dump mechanism is hydraulic . . . Prism-shaped, detachable hoppers can be used as dump hoppers or storage boxes. Hoppers operate on cable-rigged A-frame on front of small tractor . . . For off-the-road hauling, a three-wheel dump unit, of 1-cu.-yd. capacity, now is being manufactured. —CONSTRUCTION METHODS





PUMPS HEAT FROM EARTH—Heat extracted from earth by refrigerant circulated through copper coils buried in trenches heated a house in 72-74° economically in a one-season test, although temperature dropped as low as —10°F. The heat was released from condenser, installed in warm-air heating system. This reverse-refrigeration produced 3½ to 4 times the equivalent heat used by the 3-hp. compressor and ½-hp. blower motors. It required 6,357 kwh. to heat insulated 5-room, bath, and basement house for 8 months (7,620 degree-days), compared to an estimated 11,213 lb. of coal, 196,220 cu. ft. of gas, or 785 gal. of fuel oil.—ELECTRICAL WORLD

RUST PURIFIES WATER

Formation of hydrous ferric oxide from rusting steel lathe turnings in a new water-treating process reduced 12-ppm. silica concentration to 2 ppm. in a few minutes and to a trace in 60 min. As applied by Rio Grande Western RR Co., the treatment is carried out in a 7-ft.-high, 5-ft.-dia. wooden tank containing cast-iron chips on top of steel shavings. A power rake extending 8 in. into chips prevents rust growth from "cementing over" the tank. A manifold supplies 50 cfm. of air under 100 psi. —POWER

WELDS 16-STORY FRAME

About 3,000 tons of structural steel for a 16-story hospital was joined by 21,000 ft. of ¼-in. fillet welds in 15 weeks of inclement spring weather. Frame columns, milled ends butted together, were connected by simple splice plates on outside of flanges. Connections between columns of various sections were shop welded with a ¾-in. butt plate between bottom and smaller sections. Butt plate was welded to column by six ¼x2-in. fillet welds, two on each flange and two at centerline of web. Only five types of beam connections were used, all made with standard framing angles.

Crew consisted of a foreman welder and nine welders. Welding was done directly from members, eliminating need for scaffolding. —ENGRG. NEWS-RECORD

H-F COOKING CREATIONS

Foods cooked by high-frequency heater may change cooking and eating habits. New cake mixes and sandwich combinations will appear, as electronic cooking permits foods to be cooked in wrappers. Onions for hamburgers remain crisp and white; roasts are grey, with little surface crust, instead of crusty brown. Precooked frozen foods are thawed and heated almost simultaneously by high-frequency heat. —FOOD INDUSTRIES

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WELDING RODS

Coated welding electrodes and gas welding rods in various diameters, sizes and all of U. S. standard specifications. Especially desirable for the welding of carbon alloy steels and stainless steels. Also available at a very attractive price is a fine grade of automatic welding machine wire.

CUTTING TOOLS

Made in the United States of high speed and carbon steels, the following cutting tools manufactured to superior standards now may be purchased for export at remarkable low prices:

Drills • Turning Tool Bits
Reamers • Milling Cutters
Taps • Thread Cutting Dies
End Mills

the World's Greatest Sale

IS YOUR BEST OPPORTUNITY FOR ECONOMICAL BUYING

The world's largest sale of industrial equipment, machines and materials is being held daily in the United States of America. Have your U. S. Agent communicate with any one of the War Assets Administration Regional Offices.

Thousands of items are offered to you at prices far below the cost of similar items on the open market. Here is a real opportunity to secure the equipment you need—and a rare opportunity to buy your requirements at a very substantial saving.

The equipment shown here is but a small part of the huge inventory. Your United States buying agent is kept constantly informed of the materials on sale. He is acquainted with prices and procedures for buying. Instruct him immediately to take advantage of this world-wide sale on your behalf. Although Export Branches have been established in the Regional Offices shown, purchases may be made at any of the 33 Regional Offices of the War Assets Administration.

GOVERNMENT OWNED SURPLUS

WAR ASSETS

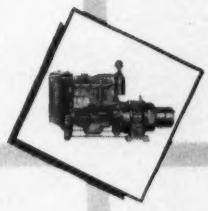
Export Branches: Boston, Massachusetts • New York, New York • Philadelphia, Pennsylvania • Chicago, Illinois • New Orleans, Louisiana • Seattle, Washington • San Francisco, California • Los Angeles, California • Cleveland, Ohio • Houston, Texas • Detroit, Michigan

FRACTIONAL HORSE-POWER MOTORS

Unexcelled value is offered in the following special motors suitable for general purpose application in industrial plants . . . mostly used, some unused:

50-60 cycle, 110 volt, 3 phase, A.C., 6/10 H.P., 950/1150 RPM, totally enclosed, weatherproof, heavy duty.

Likewise, many other types of motors, both A.C. and D.C., originally built for military application, can be converted or modified for general use.



GENERATOR SETS

Direct current 120 volts and alternating current, single and polyphase, 60 cycles 110 volts and 120/220 volts. All driven by gasoline engines.

How to Make Purchases:

All negotiations should be handled through your United States representative or exporter.

In general, terms are cash, prices f.o.b. railway cars location. However, financially responsible exporters may arrange credit from the War Assets Administration.

Unless otherwise specified by War Assets Administration, items offered are not packed for export.

The purchaser or his agent is responsible for export packing and the preparation of export shipping documents.

Exporters will be quoted the same prices as wholesalers in the United States.

Surplus items generally are sold as received from the Army and Navy. It therefore is recommended that buying agents be authorized to arrange appropriate inspection before consummating purchase.

From the vast stores of machines and materials which have been and are being declared surplus by the United States Government, your requirements may be readily satisfied. The Export Branches of War Assets Administration are ready at all times to assist in supplying your needs. Most surplus property is unused, some used. All items are subject to prior sale.

VALVES AND PIPE FITTINGS

Valves and pipe fittings for water, oil and gas pipe lines, industrial uses and ship construction. Offering includes gate valves, check valves, globe valves for high pressure use. Sizes: ¼" to 36". Only a few of these have been used.

Fittings are made of cast iron—steel—tubular steel—large variety of flanges.

Inventories are located near seaports.

AUTOMOTIVE GREASES

Here is your opportunity to buy the very best grades of automotive lubricants at sensationally low cost. Types on hand in large quantities for export are wheel bearing greases, pressure lubricants for hypoid gears, and chassis lubricants. Every automotive repair or maintenance shop needs them.

A PARTIAL LIST OF ITEMS FOR SALE

Paving Machines
Pneumatic Tools
Lacquer Dopes
Insect Repellent
Tire Repair Materials
Industrial Materials
Industrial Furnaces
Utensil Sterilizers
3 KVA Generators
Wire Rope (unused)
Direct Current Motors
Activated charcoal (Filter material for water and air purification)
Airplane Landing Mats—grid, bar and rod types
Bleaching Powders
Calcium Carbide
Carbon brushes (for motors and generators)
Chlorinated Paraffin—used for mildew proofing, flame and water resistant
Dust Collection Equipment
Dye Stuffs (mostly Khaki and Olive Drab)
Machine Tools—Boring Mills, Drills, Grinders, Milling Machines, Screw Machines, Honing, Polishing and Buffing Machines and Saws
Materials Handling Equipment
Methyl Bromide Ampules
Microcrystalline Wax
Mobile and Portable Water Purification Equipment
Oils—Hydraulic and Cutting
Optical Machinery and Equipment
Oxygen Generators (portable)
Paints—Varnishes, lacquer pigments, japans and thinners
Paint-Spraying Equipment
Pneumatic Chain Saws

CENTRIFUGALS AND SEPARATORS (INDUSTRIAL TYPES)

Surplus centrifugal and separator equipment in standard makes and sizes is available in quantity at sale prices. This equipment helps to prolong tool life, conserve cutting oils and save metals.

LUBRICANTS AND GREASES

Industrial plants and users of heavy equipment such as farm machinery will appreciate this bargain offer. Various high-grade heavy greases, industrial greases as well as soft, medium and hard cup greases are now available in barrels, 25 lb. cans and 1 lb. cans at prices well below the current market.

ADMINISTRATION

Instruct your United States buying agent to communicate with the nearest War Assets Administration Office for information concerning prices of the materials you need.

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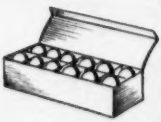

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